PB88-106448

Superfund Record of Decision (EPA Region 1) Ottati and Goss/Great Lakes Container Corporation Site, Kingston, New Hampshire January 1987

(U.S.) Environmental Protection Agency
Washington, DC

16 Jan 87

U.S. Department of Commerce
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Emergency and
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EPA/ROD/R01-87/021
January 1987

PB88-106448

EPA

Superfund Record of Decision:

Ottati & Goss, NH

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Ottati and Goss/Great Lakes Container Corporation site (O&G/GLCC) is located in Kingston, New Hampshire west of Route 125. The study area for the RI/FS includes the 35-acre O&G/GLCC site, a marsh area east of Route 125 and Country Pond adjacent to the marsh area. North Brook and South Brook drain the marsh at its interface with Country Pond. From the late 1950s through 1967, Conway Barrel & Drum Company (CBD) owned the site and performed drum reconditioning operations. The reconditioning operations included caustic rinsing of drums & disposal of the rinse water in a dry well near South Brook. As a result of State concerns regarding the proximity of the dry well to South Brook and complaints of resulting South Brook and Country Pond pollution, CBD established leaching pits in an area removed from South Brook. The State's Water Supply and Pollution Control Commission (WSPCC) reported onsite runoff and seepage from the leaching pits draining into South Brook and eventually into Country Pond. Reports included fish kills in Country Pond, dying vegetation along South Brook, and skin irritation of swimmers in Country Pond. In May 1973, International Mineral & Chemical Corporation (IMC) purchased the drum and reconditioning pland and owned and operated it until 1976. Beginning in 1978, heavy sludges (approximately thirty 55-gallon drums/month) from the wash tank and drum drainings, as well as residues from incinerator operations, were brought to the O&G site for processing. After the O&G operations
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Ottati & Goss/Great Lakes, NH First Remedial Action - Final Contaminated Media: gw, sw, soil, sediment Key contaminants: VOCs, ABN, PCBs, pesticides, metals, cyanide		

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EPA/ROD/R01-87/021
Ottati & Goss/Great Lakes, NH
First Remedial Action - Final

16. ABSTRACT (continued)

ceased in June 1979, the New Hampshire Bureau of Solid Waste Management ordered the owners & operators of the site to remove the drums and cease site operations. In September 1981, the O&G/GLCC site was placed on the National Priorities List (NPL). Contamination has been identified both on- and off-site in the ground water, surface water, and soil/sediment. The primary contaminants of concern include: volatile organic compunds (VOCs), acid and base/neutral compounds, PCBs, pesticides metals, and cyanide.

The selected remedial acton includes: excavation of approximately 5,000 cubic yards of PCB contaminated soil and sediments followed by destruction of contaminants by incineration; aeration (low temperature thermal stripping) approximately 14,000 cubic yards of contaminated soils; installation of ground water extraction and treatment system with discharge of treated ground water to upgradient ground water and possibly, to local surface waters; site grading and disposal of contaminated GLCC building materials; site cover; and installation of ground water and Country Pond monitoring systems and drinking water surveillance program. The estimated capital cost for this remedy is $8,592,500 with annual O&M costs of $1,735,000.

SITE DESCRIPTION AND SUMMARY OF REMEDIAL ALTERNATIVE SELECTION FOR THE OTTATI & GOSS/GREAT LAKES CONTAINER CORPORATION SITE

January 16, 1987
US EPA
Boston, Massachusetts

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

Site: Ottati & Goss/Great Lakes Container Corporation

Kingston, New Hampshire

Documents Reviewed

I am basing my decision concerning the appropriate remedial alternative for the Ottati & Goss/Great Lakes Container Corporation Site (O&G/GLCC Site) primarily on the following documents. A substantial number of additional documents are included in the administrative record as well.

1. O&G/GLCC Remedial Investigation/Feasibility Study, Volumes I-VII, August 1986, prepared by Goldberg-Zoino and Associates, Inc.

2. Summary of Remedial Alternative Selection.

3. Community Relations Responsiveness Summary.

4. December 1985 Opinion in United States, et al. v. Ottati & Goss, Inc., et al

5. Testimony and Exhibits introduced in United States, et al. v. Ottati & Goss, Inc., et. al

6. Public Comments

7. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986.

8. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300, November 20, 1985.

Description of Preferred Remedial Alternative

- Excavation of approximately 5,000 cubic yards of PCB contaminated soil and sediments followed by destruction of contaminants by incineration.

- Aeration (low temperature thermal stripping) of approximately 14,000 cubic yards of contaminated soils.

- Installation of groundwater extraction and treatment system with discharge of treated groundwater to upgradient groundwater, and possibly, to local surface waters.

- Site grading and disposal of contaminated GLCC building materials.

- Site Cove

- Installation of groundwater monitoring system, drinking water surveillance program, and Country Pond monitoring system.

° Operation and Maintenance

Maintenance will include lawn mowing of the grass cover system, clearing obstructions from the site stormwater drainage systems, and regrading of the site as necessary. Monitoring will include sampling and analysis of upgradient and downgradient monitoring wells; of surface waters including Country Pond; and of area private water supply wells.

Declaration

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA or the 1986 Act), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R Part 300. I have determined that at the O&G/GLCC Superfund Site, the selected remedial alternative is cost-effective, consistent with a permanent remedy and provides adequate protection of public health and welfare and the environment.

The State of New Hampshire has been consulted and concurs with the selected remedial alternative.

I have determined that the action being taken is consistent with Section 121 of SARA and is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

The action will require operation and maintenance activities to ensure continued effectiveness of the remedial alternative as well as to insure that the performance objectives meet applicable state surface and groundwater quality criteria.

1/16/87
Date

[signature]
Regional Administrator

The authority to sign this Record of Decision under the 1986 Superfund Amendments has not yet been delegated by President Reagan. This ROD will become effective upon my receipt of such delegation.

1/16/87
Date

[signature]
Regional Administrator

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SITE DESCRIPTION AND SUMMARY
OF REMEDIAL ALTERNATIVE SELECTION FOR THE
OTTATI & GOSS/GREAT LAKES CONTAINER CORPORATION SITE

SITE LOCATION AND DESCRIPTION

The Ottati & Goss/Great Lakes Container Corporation (O&G/GLCC) site was placed on the National Priorities List on September, 1981. The site is located immediately west of Route 125 in Kingston, New Hampshire, as shown on Figure 1. The entire site, depicted on Figure 2, consists of approximately 35 acres. The site is bounded on its easterly side by Route 125 and is traversed by an Exeter-Hampton Electric Company power line easement. Approximately 28 acres of the site are owned by the Senter Transportation Co. (Senter) with the remaining 5.88-acre portion currently owned by Great Lakes Container Corporation (GLCC). The GLCC property contains a one-story cinder block building. Senter Transportation leased an approximately one-acre parcel in the southwestern portion of the site to the Ottati & Goss, Inc. in 1978.

The site occupies an east-west trending topographic valley which drains to the east toward a marsh area east of Route 125. Site topographic relief is on the order of 10 feet, decreasing from a ground surface elevation of approximately 135 to 140 feet above mean sea level at its westerly edge to approximately 125-130 feet just west of the Route 125 embankment.

Two brooks traverse the site to the north and south. North Brook flows eastward near the northerly boundary of the site through a culvert beneath Route 125 and into the marsh adjacent to Country Pond. South Brook flows eastward near the southerly edge of the site, through a culvert beneath Route 125 and into the marsh. These brooks drain several marshy areas of seasonally ponded surface water on-site.

The study area for the RI/FS includes the O&G/GLCC site, a marsh area east of Route 125, and Country Pond adjacent to this marsh area. The marsh is somewhat triangular in shape and wooded, with an area of approximately 40 acres. Three small brooks were observed draining the marsh at its interface with Country Pond, the northern-most of which is North Brook.

The O&G/GLCC site is underlain by 20 to 50 feet of soil deposits consisting of fill, glacial outwash, glacial ice contact deposits, and glacial till. Fill materials appear to be granular and to locally contain buried drums and drum fragments. Outwash and ice contact deposits consisted of sands and gravels and are considered to comprise a relatively permeable overburden aquifer. Glacial till underlying the aquifer, while relatively less permeable than other unconsolidated deposits, was not observed in all borings and is not considered very restrictive of groundwater flow between the overburden aquifer and underlying bedrock. Bedrock, to the depth investigated (30 to 40 feet below the bedrock/overburden contact), was observed to consist of schist with pegmatite and

granite intrusions. The schist was observed to be slightly weathered and slightly to moderately fractured. The pegmatite and granite encountered in the rock cores were observed to be fresh to slightly weathered, and fractured to a similar degree as the schist. Permeability of the bedrock was generally observed to be low to very low.

Bedrock topographic data contained in the Remedial Investigation/ Feasibility Study indicate that a Y-shaped trough or depression trending to the east underlies the site west of Route 125 with the 2 "forks" portion of the GLCC site. Available data suggest this depression continues to the east of Route 125. A possible bedrock high was observed in the north central portion of the marsh.

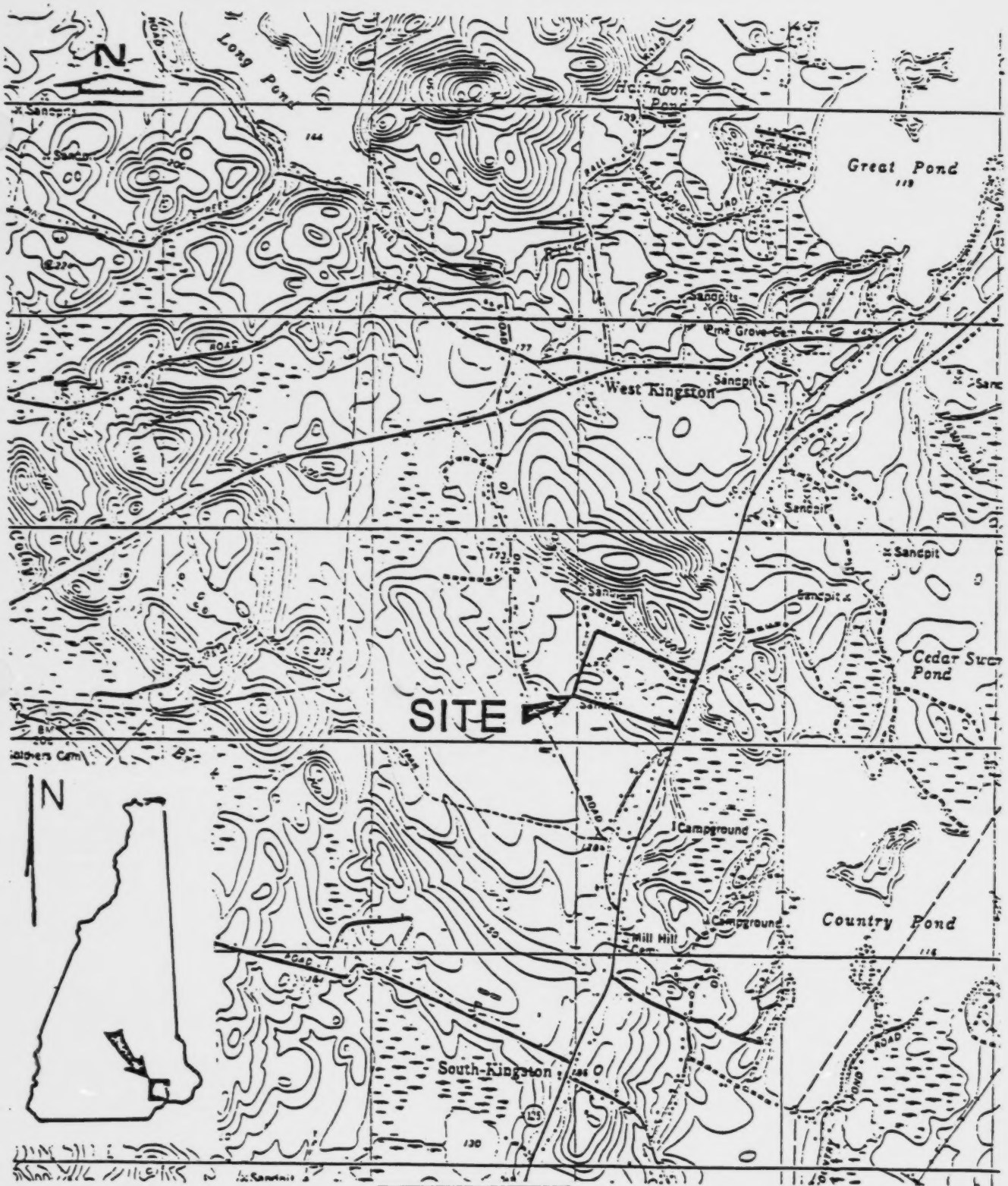
Groundwater within the overburden aquifer beneath the O&G/GLCC site flows to the northeast across the site toward the topographic low associated with North Brook. Upon approaching North Brook, flow becomes southeasterly. Overburden groundwater flow converges and flows under Route 125 at the eastern edge of the site. Southeasterly groundwater flow continues within the marsh area east of Route 125 toward Country Pond.

On-site, where ice contact deposits predominate, the rate of groundwater flow was estimated at approximately 60-240 feet per year. In the marsh area, where more permeable outwash deposits predominate, the rate of groundwater flow was estimated at approximately 110 to 330 feet per year.

Both upward and downward hydraulic pressure gradients between the bedrock and the overburden, as well as within the bedrock, were observed at various locations around the site. The presence of significant downward gradients in some areas, together with the lack of a continuous impermeable soil layer between overburden and bedrock, indicates the potential for localized migration of overburden aquifer contaminants into bedrock.

Groundwater is the present drinking water source in the study area. Water is supplied by individual residential wells deriving water from unconsolidated bedrock aquifers. To date, no residential well contamination has been attributed to the site. There is presently no state or municipal restriction of groundwater use in the vicinity of the site.

Groundwater, surface water, and soil/sediment contamination is identified both on and off site. The major classes of compounds detected include volatile organic compounds (VOCs), acid and base/neutral (ABN) extractable organic compounds, polychlorinated biphenyls (PCBs), and metals.



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LOCUS PLAN

O &G/GLCC SITE

KINGSTON, N.H.

GZA

Figure 1

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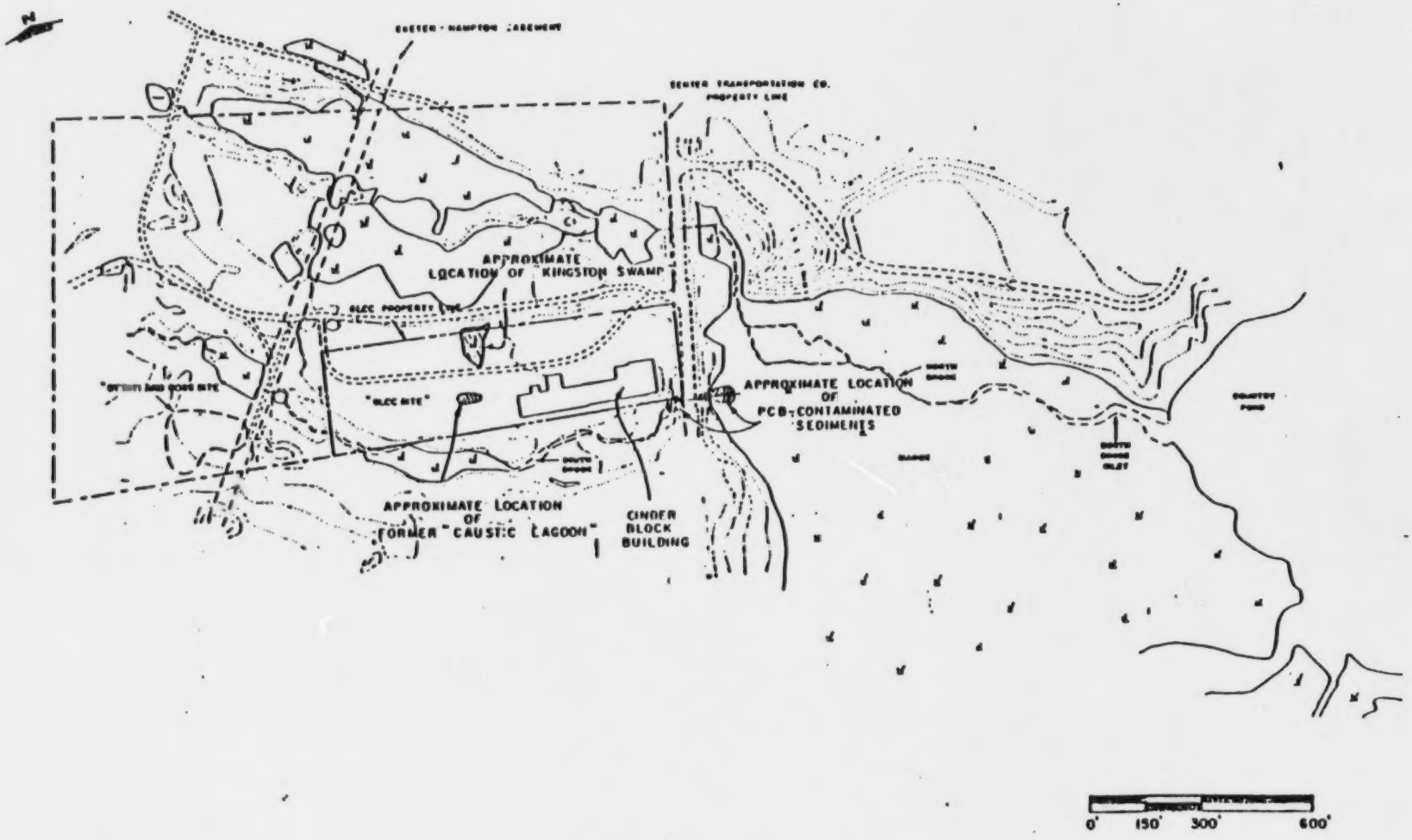


SITE PLAN

O &G/GLCC SITE

KIN[illegible]TON, N.H.

FIGURE 2

SITE HISTORY

Portions of the site have been used for drum reconditioning operations and for disposal of hazardous materials since at least the late 1950's. The following summary of site history and plant operations is based on discussions with personnel from the U.S. EPA, New Hampshire Water Supply and Pollution Control Commission (WSPCC), and the U.S. Department of Justice; depositions and court testimony from ongoing litigation (United States, et al. vs. Ottati & Goss, Inc., et al.); and the Findings of Fact.

From the late 1950's through 1967, drum reconditioning operations were performed on the present GLCC site by the Conway Barrel and Drum Company (CBD), owned by Messrs. James and Daniel Conway. Available information concerning site operations of the CBD is limited. A State of New Hampshire Water Pollution Board (WPB) memorandum dated September 28, 1961, indicated that the CBD was established in 1959 for the purpose of reconditioning drums. WSPCC files indicate that reconditioning operations included caustic rinsing of drums and apparent disposal of the caustic rinse water in a dry well in the vicinity of South Brook. The location of the dry well was not documented.

As a result of State concerns regarding the proximity of the dry well to South Brook and complaints of resulting South Brook and Country Pond pollution, CBD established a "leaching pit" in an area removed from South Brook. This pit is commonly referred to as the "caustic lagoon" and was located on the property approximately 150 feet to the west of the existing cinder block building. The approximate location of the former caustic lagoon is shown on Figure 2.

A review of WSPCC files indicated numerous complaints against CBD by area residents. These complaints focused on on-site runoff and seepage from leaching pits draining into South Brook and eventually into Country Pond. Complaints included reports of fish kills in Country Pond, dying vegetation along South Brook, and skin irritation of swimmers in Country Pond.

In 1967, Messrs. Leroy Boudreaux and Daniel Conway formed the Kingston Steel Drum Company (KSD) which continued site operations until 1973. The KSD operations consisted of reconditioning both open head and closed head drums.

For open head drums, residues were emptied into 55 gallon drums which were reportedly hauled away from the site. Emptied drums were then passed through an incinerator to burn off remaining residues and subsequently brought into the plant for sand blasting, dedenting, and lining operations.

Reconditioning operations for the closed head drums differed from those for the open head drums. The closed head drums were pre-flushed and then rinsed with a caustic rinse solution. The drums were then washed in a dilute hydrochloric acid solution, sand blasted, and dedented. Caustic rinse water was disposed of in the previously described caustic lagoon located approximately 150 feet to the west of the cinder block building.

As described in a March 28, 1973 International Mineral and Chemical Corporation (IMC) memorandum, the caustic lagoon was a barbell shaped pond averaging approximately 25 feet in width, 100 feet in length and 3 feet in depth. An oil layer 1-1/2 feet thick was reported to cover the lagoon. According to the IMC memorandum, in 1973 the caustic lagoon received approximately 4,000 gallons/day of caustic rinse water.

Another small pond, commonly referred to as the "Kingston Swamp" was described in the same 1973 IMC memorandum as being generally circular in shape, approximately 100 feet in diameter and 1 foot deep. The approximate former location of the "Kingston Swamp" is shown on Figure 2.

In May 1973, KSD was purchased by IMC, who owned and operated the drum reconditioning plant from 1973 until 1976. With some modifications, IMC continued drum reconditioning in a manner similar to KSD, though apparently on a larger scale. Modifications apparently included measures intended to reduce the potential for pollution at the site. In the March 28, 1973 IMC memo, three potential pollution sources were identified by IMC prior to its purchase of the site. These included the caustic lagoon, the "Kingston Swamp", and spill water, including floor washings and building rinse water from the north side of the plant which eventually discharged into South Brook. Water samples collected in March 1973 by IMC indicated degraded water quality in the caustic lagoon, "Kingston Swamp", and on-site drainage into South Brook at Route 125.

The "Kingston Swamp" was reportedly backfilled in 1973 and the caustic lagoon was backfilled in 1974. Oil separation equipment was installed and IMC, and later GLCC, stored "deoiled" and "oily" wastes from the closed head drum process in separate on-site holding tanks.

Heavy sludges (approximately thirty 55-gallon drums per month) from the wash tanks and drums drainings, as well as residues from incinerator operations, were brought to the O&G site for "processing" beginning in 1978. After the O&G operations ceased, in June 1979, GLCC continued processing these sludges on-site in a manner similar to the O&G process. GLCC reconditioning

operations ceased in July 1980. A large number of drums were reportedly removed by GLCC in 1981.

Between July and December 1984, IMC performed drum excavation and removal operations at the GLCC site. These operations included excavating large portions of the GLCC site where drum burial was suspected based on previous test pit excavations, geophysical data, and court testimony. The O&G site was operated by Ottati and Goss, Inc., Mr. Louis Ottati, and Mr. Wellington Goss, from March 1978 through June 1979. During this time, site operations consisted of "processing" hazardous materials brought to the site in drums. This processing apparently involved emptying the contents of the drum in the box of a dump truck and mixing the wastes with sawdust and lime. The mixed waste and sawdust was then placed in dumpsters and reportedly removed from the site.

Material processed at the site allegedly included sludges from the GLCC site. On July 1, 1979 the New Hampshire Bureau of Solid Waste Management ordered the owners and operators of the O&G site to remove the drums and cease site operations. Between December 1980 and July 1982, EPA processed and removed approximately 4000 drums of waste from the O&G site. IMC, the owner and operator of the KSD drum reconditioning plant from 1973 to 1976, performed drum excavation and removal operations between July and December 1984. All stockpiled contaminated soils were removed from the site by June 1985. The total volume of contaminated soils, drums, and metal debris removed was approximately 12,800 tons. However, results of the Remedial Investigation (RI) indicate that additional drum fragments, crushed drums, and contaminated soil remain on the site.

CURRENT SITE STATUS

Goldberg-Zoino & Associates (GZA), under contract with the New Hampshire Water Supply and Pollution Control Commission, completed a Remedial Investigation/Feasibility Study (RI/FS) for the O&G/GLCC Site in August 1986. Data collected in the RI and in previous studies done by Ecology and Environment (E&E), under contract with EPA; P.E. LaMoreaux and Associates (PELA), consultants to GLCC; Roy F. Weston (RFW), consultants to GLCC; and Camp, Dresser & McKee (CDM), consultants to International Minerals and Chemical Corporation; were used to describe the nature and extent of contamination. Contamination sources, contaminant transport, environmental receptors impacted and suspected risks posed by contaminants are evaluated in the Remedial Investigation/Feasibility Study Report. The following is a brief summary of the types and concentrations of contaminants detected in soil, sediment, groundwater, surface water, and air.

- Soil

Elevated concentrations of VOCs, PCBs, ABNs, metals and cyanide have been observed in on-site soils at numerous locations on one or both of the O&G/GLCC portions of the site. At least four

major VOC contamination (high of 870,000 ppb) source areas have been identified; the GLCC caustic lagoon area, the "Kingston Swamp" area, an area immediately east of the cinder block building on the GLCC site, and the O&G site. Of the VOCs identified at the O&G/GLCC site, four of the contaminants are probable or known carcinogens. They are: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, and benzene. Sampling performed subsequent to the IMC removal identified maximum concentrations of trichloroethylene of 3,900 ppb and tetrachloroethylene of 160,000 ppb in the vicinity of the caustic lagoon. A further discussion of these carcinogens is included in the Management of Migration Remedy. Due to past waste disposal practices at the site, it is likely that additional localized contaminant source areas exist. The observation of buried drums in the upper 6 feet of soil at numerous locations indicates the potential for concentrated "point" sources for VOCs, and perhaps, other contaminants.

PCBs were observed in soils over a wide area of the site. The highest PCB concentrations (143,000 ppb) were observed in the "Kingston Swamp" and caustic lagoon areas.

ABN compounds (high of 19,000 ppb) were observed in on-site soils at numerous locations in concentrations on the same order as VOCs, although there is no apparent correlation in terms of spatial distribution between ABNs and VOCs. The mobility of ABNs in groundwater or surface water is limited due to their propensity to absorb onto finegrained soil particles. Many metals and cyanide were observed at elevated concentrations in on-site soils; highest concentrations were observed in areas of suspected past disposal activity. As with VOC contamination, past practices at the site suggest that additional, localized contaminant source areas are likely present. Although both arsenic and nickel have been observed at elevated concentrations in groundwater downgradient of the site, arsenic concentrations in on-site soils did not exceed those observed at presumed background sampling points.

* Surface Water and Sediments

The principal contaminants of concern transported in surface waters in North and South Brooks are dissolved VOCs (high total VOC concentration of 500 ppb) in surface waters and sediments (high total VOC concentration of 6,000 ppb) in the vicinity of the North Brook inlet to Country Pond. These VOC concentrations appear to be related to upward discharge of contaminated groundwater. Despite the presence of VOCs in pond water and sediments in the vicinity of the North Brook inlet, volatilization and pond dispersion characteristics likely account for the lack of detection of VOCs in other areas of the pond.

Also of concern is the apparent transport of PCB-contaminated South Brook sediments into the marsh area, where up to 14,000 ppb of PCBs has been reported by EPA, based on the results of sampling performed in May 1980.

° Groundwater

The groundwater contaminants of principal concern at the O&G/GLCC site are VOCs, arsenic, and nickel, iron and manganese. ABNs appear to be highly attenuated relative to VOCs. PCBs/pesticides were not observed in groundwater downgradient of the site.

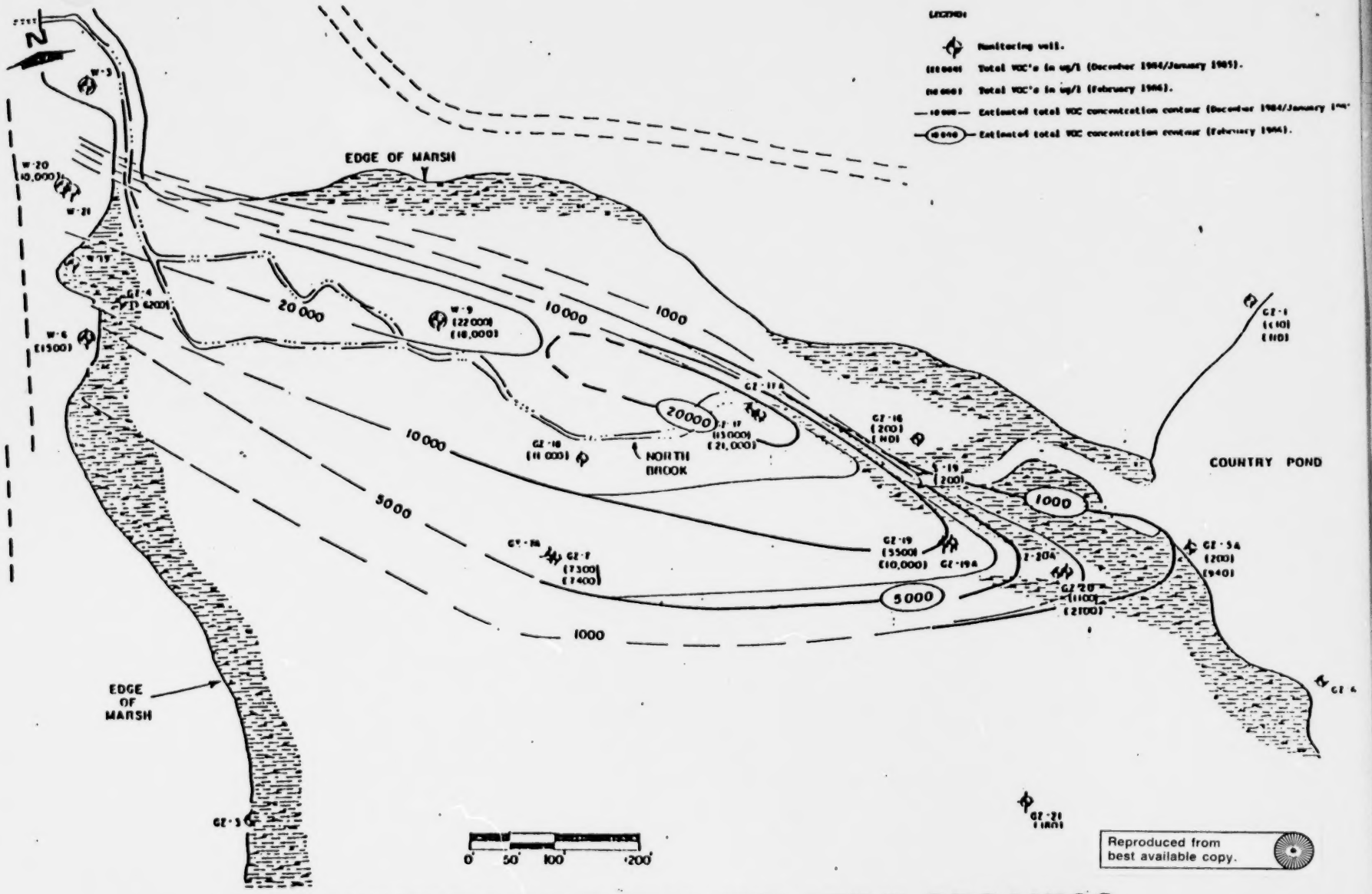
VOC groundwater contamination arises from numerous on-site source areas, most notably the O&G site, the caustic lagoon area, the "Kingston Swamp" area, and the area east of the GLCC cinder block building. Total VOC concentrations in groundwater in these areas generally have exceeded 10,000 ppb. The Court found the O&G plume moves generally from southwest to northeast and then parallel to North Brook and towards Route 125 and the marsh.

Individual contaminant plumes generated on-site would merge due to converging groundwater flow. East of Route 125, the plume appears to be limited to the northern third of the marsh area. Contaminants within the marsh are estimated to be migrating at a rate of 110 to 330 feet/year, have crossed the marsh area and impacted groundwater at the western edge of Country Pond. Total VOC concentrations in the western half of the marsh are on the same order but somewhat lower than those observed on-site. Figure 3 shows the distribution of VOCs off-site in the marsh.

Data concerning the spatial distribution and migration of arsenic and nickel in groundwater, though limited in quantity, suggest that these contaminants are migrating off-site in groundwater.

° Air

In February 1981, EPA collected eight 2- to 24-hour air samples in the vicinity of the O&G/GLCC site using either a tenax or a charcoal trap. Samples were analyzed for VOCs by GC/MS. The data provided in Appendix H of the RI/FS indicate no detectable levels of VOCs, with a detection limit of 50 ppb. GZA monitored air quality on- and off-site during site drilling operations using an organic vapor analyzer (OVA). VOC background concentrations both on-site and off-site were observed to be on the order of 0.2 to 0.4 ppm (200 to 400 ppb) during the September to December 1983 field exploration program. Since this concentration is near the detection limit of the OVA instrument, the above estimates may be considered to be a conservative estimate of background ambient air conditions prevalent both on- and off-site. The lack of discernible difference in on-site and off-site background OVA readings suggests that emissions of organic vapors during the site exploration program occured at concentrations below approximately 200 ppb. Though data are limited, it appears that the threat to human or environmental receptors posed by emissions of contaminants to the atmosphere is minimal. However, circumstances that alter existing site conditions, such as excavation of on-site materials or extensive remedial activity, should be accompanied by an air quality monitoring program to protect on-site and off-site receptors and to provide additional data concerning this potential contaminant migration pathway.



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DISTRIBUTION OF TOTAL VOLATILE ORGANICS

(DECEMBER 1984-FEBRUARY 1986)

O &G/GLCC SITE

FIGURE 3

RISK ASSESSMENT

A baseline risk assessment was conducted to evaluate the risk to public health and the environment associated with the O&G/GLCC site in the absence of remedial action. The risk assessment was developed as follows: identify contaminants of concern; describe pathways of exposure associated with site contaminants; estimate levels of exposure and determine populations potentially exposed; characterize potential risks to humans and the environment.

Contaminants of Concern

A variety of different chemicals were found at the site, including volatile organic compounds (VOCs), acid and base/neutral (ABN) compounds, metals, cyanide, and PCB/pesticides. Many of these contaminants occur at substantial concentrations on-site, but considerably fewer have been observed to be migrating off-site. The VOCs appear to be the most mobile of site contaminants. VOCs have been observed in downgradient groundwater, surface water and sediments. PCB/pesticides, ABN compounds, metals, and cyanide appear to be less mobile. Possible exceptions include arsenic and nickel, where data suggest downgradient migration. ABN compounds have been detected at relatively high levels in the marsh area. PCB/pesticides have not been observed in downgradient groundwater or surface water. PCBs have been identified in the ppm range in South Brook sediments on-site and within the marsh area, as well as in on-site soils.

The various chemicals found on and off-site may cause a variety of different adverse health effects, depending upon the type of chemical and the concentration found. Some of the compounds present are known or suspected human carcinogens, such as benzene, arsenic, tetrachloroethylene, trichloroethylene and 1,2,dichloroethane, whereas other compounds may cause kidney and liver disorders and other adverse effects if chronic exposure to sufficient levels occurs.

Exposure Pathways/Exposure Populations

There are a variety of potential pathways of exposure to chemicals at the O&G/GLCC site. The following pathways were evaluated: ingestion of groundwater by contact with contamination in overburden, bedrock or Country Pond; ingestion of contaminated food, primarily focusing on fish consumption; inhalation of contaminated vapors or particulates from the site, dermal contact with contaminated soils, sediment or water on or off-site; ingestion of or dermal contact with contaminated media by birds and wildlife visiting the site.

EPA believes that based upon the risk assessment and the information available, the on-site soils present a direct contact risk. The soils also pose a risk as a source for the contaminated groundwater. The contaminated groundwater on-site and in the marsh pose a human health risk to anyone who drinks the water. The PCBs in the sediment also pose a human health risk through ingestion.

Risk Characterization

High levels of contamination are present on site, and have migrated in the groundwater east of Route 125 to where the marsh and Country Pond meet, as well as under the Pond itself. The Court has found that many of the chemicals are present on site in concentrations much higher than acceptable levels. Sampling data from the the RI/FS show that many hazardous substances in the soil and groundwater continue to be present in concentrations substantially above acceptable limits. Humans and biota may be exposed to these concentrations through ingestion, inhalation and dermal contact. Although on site risks were not quantified, they are potentially significant, as the site is accessible to humans and wildlife. This is particularly so since the site has the potential to be developed. Although most of the on site soil data indicates subsurface contamination, this does not preclude exposure, as areas of contaminated soils may be disturbed now or in the future, resulting in an opportunity for exposure. Moreover, surface contamination existed in the past, and such contamination may continue to be present.

For the groundwater ingestion pathways, results of sampling performed on groundwater on site and in the marsh revealed levels of various contaminants at concentrations to present a considerable risk if the site was ever developed and a person installed a well and consumed the water.

DEVELOPMENT OF ALTERNATIVES

The remedial alternatives for the O&G/GLCC site were developed and evaluated using the "Guidance on Feasibility Studies under CERCLA" and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 C.F.R. § 300.68 as guidance. To the extent that it was both possible and appropriate at least one alternative was developed in each of the folloiwng categories, as required by 40 C.F.R. § 300.68(f)(1) of the NCP:

1. Alternatives specifying off-site storage, destruction, treatment, or secure disposal of hazardous substances at a facility approved under the Resource Conservation and Recovery Act (RCRA). Such a facility must also be in compliance with all other applicable EPA standards (e.g., Clean Air Act, Toxic Substances Act).

2. Alternatives that meet all applicable or relevant federal public health or environmental standards, guidance, and advisories.

3. Alternatives that exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories.

4. Alternatives that meet CERCLA goals but do not attain all applicable or relevant federal public health or environmental standards, guidance, and advisories.

5. No action alternatives.

Prior to the development of alternatives, the Feasibility Study performed an evaluation of general response actions and technology screening for inclusion in proposed remedies applicable to the O&G/GLCC site. General response actions are broad response categories based on the findings of field work conducted. Technology screening considers the waste-limiting (waste characteristics that limit the effectiveness or feasibility of a technology) and site-limiting (site characteristics such as soil permeability that preclude the use of a technology) factors unique to the O&G/GLCC site, and the level of technical development for each technology.

The screening of the various technologies was based on the following criteria:

1. The technology must be reliable, based either on successful implementation at other hazardous waste sites, or in comparable applications;

2. The technology must be technically feasible, reliable, and applicable to site conditions and waste characteristics at the O&G/GLCC site, based on engineering judgement; and

3. The technology must be capable, by itself, or in conjunction

with other alternatives, of addressing at least one of the FS objectives.

Technologies that did not meet all of the above criteria were excluded from further consideration.

Table 1 lists the various technologies that were considered appropriate for evaluation at this site. Technologies which emerged from this screening process were then combined into source control and management of migration alternatives. As a result, eighteen (18) remedial action alternatives, as specified on Table 2, were developed for evaluation.

INITIAL SCREENING

The eighteen (18) remedial alternatives have been subjected to an initial screening consistent with 40 C.F.R. § 300.68(g)(1), (2), and (3) of the NCP to narrow the list of potential remedial actions for further detailed analysis. The initial screening process eliminated the following twelve (12) alternatives:

1. Alternatives 1A and 1B

   - 300.68 (g)(3); Do not effectively contribute to protection of public health and welfare.

2. Alternatives 2 - Alternative 6

   - 300.68(g)(3); Do not address off-site migration of contaminated groundwater. As a result, do not effectively contribute to the protection of public health and welfare.

3. Alternative 8

   - 300.68(g)(3); Is not considered effective in addressing on-site source contamination.

4. Alternative 9

   - 300.68(g)(3); Is not considered effective in controlling on-site contaminant release.

5. Alternatives 10A & 10B

   - 300.68(g)(2); Is not considered acceptable engineering practice since subsurface conditions are not conducive to the successful use of a soil/bentonite wall.
   - 300.68(g)(3); Use of cap not considered sufficient in controlling release of contaminants and does not effectively contribute to protection of public health.

6. Alternative 11

   - 300.68(g)(3); Is not considered effective in removing continued release of on-site contamination and thus not protective of public health and welfare.

TABLE 1
SUMMARY OF TECHNOLOGY SCREENING
LISTING OF REMEDIAL TECHNOLOGIES

- SURFACE WATER CONTROLS
  - Grading
  - Revegetation
  - Diversion and Collection Systems
- LEACHATE & GROUNDWATER CONTROLS
  - Capping
  - Groundwater Pumping
  - Containment and Barriers
- GAS MIGRATION CONTROLS
  - Gas Collection
- EXCAVATION & REMOVAL OF WASTE & SOIL
  - Excavation and Removal
  - Grading
  - Capping
  - Revegetation
  - Cover
- REMOVAL & CONTAINMENT OF CONTAMINATED SEDIMENTS
  - Sediment Removal
- IN-SITU TREATMENT
  - Soil Aeration
- DIRECT WASTE TREATMENT
  - Incineration
  - Biological Treatment
  - Physical and Chemical Treatment
  - Solid Handling and Treatment
- LAND DISPOSAL
  - Landfills
- CONTAMINATED WATER SUPPLIES & SEWER LINES
  - Alternative Drinking Water Supplies

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- LAND USE RESTRICTIONS
  - Restrict Site Access/Security Fencing
  - Deed Restrictions
  - Land Use Restrictions
- ENVIRONMENTAL MONITORING
  - Groundwater
  - Surface Water
  - Air
  - Fish

TABLE 2

LISTING OF REMEDIAL ALTERNATIVES

ALTERNATIVE NUMBER	DESCRIPTION
1A	No action
1B	No action; with site monitoring
1C	No action; with site monitoring and land use restrictions
2	RCRA GLCC site cap; O&G source excavation and relocation
3	RCRA GLCC site cap; O&G source excavation and relocation; and disposal or aeration on-site of highly contaminated soils, wastes, and sediments
4	RCRA GLCC site cap; O&G source excavation and relocation; and complete perimeter soil/bentonite cutoff wall
5	RCRA GLCC site cap; O&G source excavation and relocation; and upgradient soil/ bentonite cutoff wall
6	RCRA GLCC site cap; O&G source excavation and relocation; and upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, wastes, and sediments
7	RCRA GLCC site cap; O&G source excavation and relocation; and upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, wastes, and sediments
8	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation
9	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; disposal or aeration on-site of highly contaminated soil, waste, and sediments

10A	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; perimeter soil/bentonite cutoff wall
10B	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient soil/bentonite cutoff wall
11	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient groundwater interceptor trench
12	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, waste, and sediments
13	Alternate water supply; groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, waste, and sediments
14	Complete removal of on-site and off-site hazardous soils, waste, sediments, groundwater, with off-site disposal
15	Excavation and on-site treatment of contaminated soils, wastes, and sediments; groundwater extraction and treatment; site cover

DETAILED EVALUATION OF ALTERNATIVES

A detailed evaluation of each of the six (6) alternatives remaining after the initial screening was conducted in the RI/FS consistent with 40 C.F.R. § 300.68(h) of the NCP. For each alternative, the following factors, as appropriate, were considered:

(1) Detailed cost estimation, including operation and maintenance costs, and distribution of costs over time;

(2) Evaluation in terms of engineering implementation, reliability, and constructibility;

(3) An assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of public health and welfare and the environment. This included an evaluation of the extent to which the alternative attains or exceeds applicable or relevant and appropriate federal public health and environmental requirements. Where the analysis determined that federal public health and environmental requirements are not applicable or relevant and appropriate, the analysis, as appropriate, evaluated the risks of the various exposure levels projected or remaining after implementation of the alternative under consideration;

(4) An analysis of whether recycle/reuse, waste minimization, waste biodegration, or destruction, or other advanced, innovative, or alternative technologies is appropriate to reliably minimize present or future threats to public health or welfare or the environment;

(5) An analysis of any adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation.

The remaining alternatives after preliminary screening are: 1C, 7, 12, 13, 14, and 15. A description of these final alternatives is included on Table 3. Table 4 lists the capital and present worth costs for these alternatives.

Alternative 1C - No Action, with Land Use Controls and Water Quality Monitoring. The no-action alternative at the O&G/GLCC site consists of allowing the site to remain in its existing condition. However, actions would be undertaken to limit the potential risks posed by the site to public health and the environment. These actions include instituting land use controls (security fencing around the site) and a water quality and fish (environmental) monitoring program. The environmental monitoring program would allow periodic reassessment of public health and environmental risks posed by the site, and would include annual sampling of all bedrock wells within an approximate 1.5 mile radius of the site. It is anticipated that the environmental monitoring program would extend for at least the first ten (10) years following site closure and would be extended if warranted.

Table 3

REMEDIAL ALTERNATIVES PASSING
PUBLIC HEALTH AND ENVIRONMENTAL SCREENING

Alternative	Description
1C	No Action; with site monitoring and land use restrictions.
7	Upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soils, wastes and sediments; RCRA GLCC site cap; O & G source excavation and relocation.
12	Upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soils, wastes, and sediments; groundwater extraction and treatment; RCRA GLCC site cap; O & G source excavation and relocation.
13	Alternative 12, plus an alternate water supply.
14	Complete removal of on-site and off-site hazardous soils, wastes, and sediments to an off-site RCRA facility.
15	Excavation and on-site treatment of contaminated soils, wastes, and sediments; groundwater extraction and treatment; site cover.

Notes:

1. Alternatives 1C through 15 include provisions for periodic environmental quality monitoring and land use controls as discussed in Sections 2.2.2 and 2.2.3 of the FS.

2. Alternatives 7, 12 and 13 include on-site disposal or aeration of highly contaminated soils as follows:

   a. VOC concentrations greater than 1 ppm and PCB concentrations greater than 50 ppm; aeration of soil to reduce VOC concentrations to less than 1 ppm followed by disposal in a RCRA landfill on-site.
   b. VOC concentrations greater than 1 ppm and PCB concentrations less than 50 ppm: aeration of soil to reduce VOC concentrations to less than 1 ppm followed by on-site disposal under a RCRA cap.
   c. VOC concentrations less than 1 ppm and PCB concentrations greater than 50 ppm: soil disposed in an on-site RCRA landfill.

d. VOC concentrations less than 1 ppm and PCB concentrations less than 50 ppm: soil left in place to be covered by a RCRA cap.
e. Marsh sediments in drainage swale to the east of Route 125 to be removed to residual PCB concentrations of 1 ppm or less. PCB material disposal on-site in a RCRA landfill.

3. Alternative 15 includes on-site treatment to an acceptable residual soil concentration via incineration.

TABLE 4

REMEDIAL ALTERNATIVES PASSING
PUBLIC HEALTH AND ENVIRONMENTAL SCREENING

ALTERNATIVE		CAPITAL COST (x $1000)	PRESENT WORTH (x $1000)
1C	No Action.	202	1,029
7	Upgradient groundwater interceptor trench; disposal or on-site aeration of highly contaminated soil, wastes and sediments; RCRA cap over GLCC site; O&G source excavation and relocation.	4,150	5,543
12	Upgradient groundwater interceptor trench; disposal or on-site aeration of highly contaminated soil, wastes and sediments; groundwater extraction and treatment; RCRA cap over GLCC site O&G source excavation and relocations	6,713	10,499
13	Similar to Alternative 12 plus an alternative water supply.	10,787	14,358
14	Complete excavation and removal of on-site and off-site contaminated soils, wastes, and sediments to an off-site RCRA facility.	33,878	34,705
15	Excavation and treatment of contaminated soils, wastes, and sediments; groundwater extraction and treatment; site cover.		
	Estimated 1×10^{-4} cancer risk:	12,073	14,825
	Estimated 1×10^{-5} cancer risk:	14,023	17,759
	Estimated 1×10^{-6} cancer risk:	16,298	20,847
	Estimated 1×10^{-7} cancer risk:	25,723	31,236

Notes:

1. Costs are estimated with an accuracy of -30 to +50 percent.
2. Present worth estimates are based on a 10% discount rate.
3. Capital costs include 25% indirect costs for design and engineering and construction contingencies.
4. Alternatives 12 and 13 assume 4 years of groundwater extraction and treatment at 100 gpm.
5. Refer to the text and Appendix D for assumptions made in estimating costs.

The no-action alternative is not appropriate because it would not do anything to permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances at the site. Precipitation at the site would continue to leach mobile contaminants such as VOCs from source areas. VOC levels in site soils and groundwater would decrease over time due to dilution from precipitation and natural attenuation mechanisms. The rate of attenuation would be difficult to predict. However, on-site soils and groundwater are not expected to approach background levels for mobile constituents (VOCs) within 30 years. In addition, non-mobile constituents such as heavy metals and PCB's would likely remain essentially at currently observed levels indefinitely.

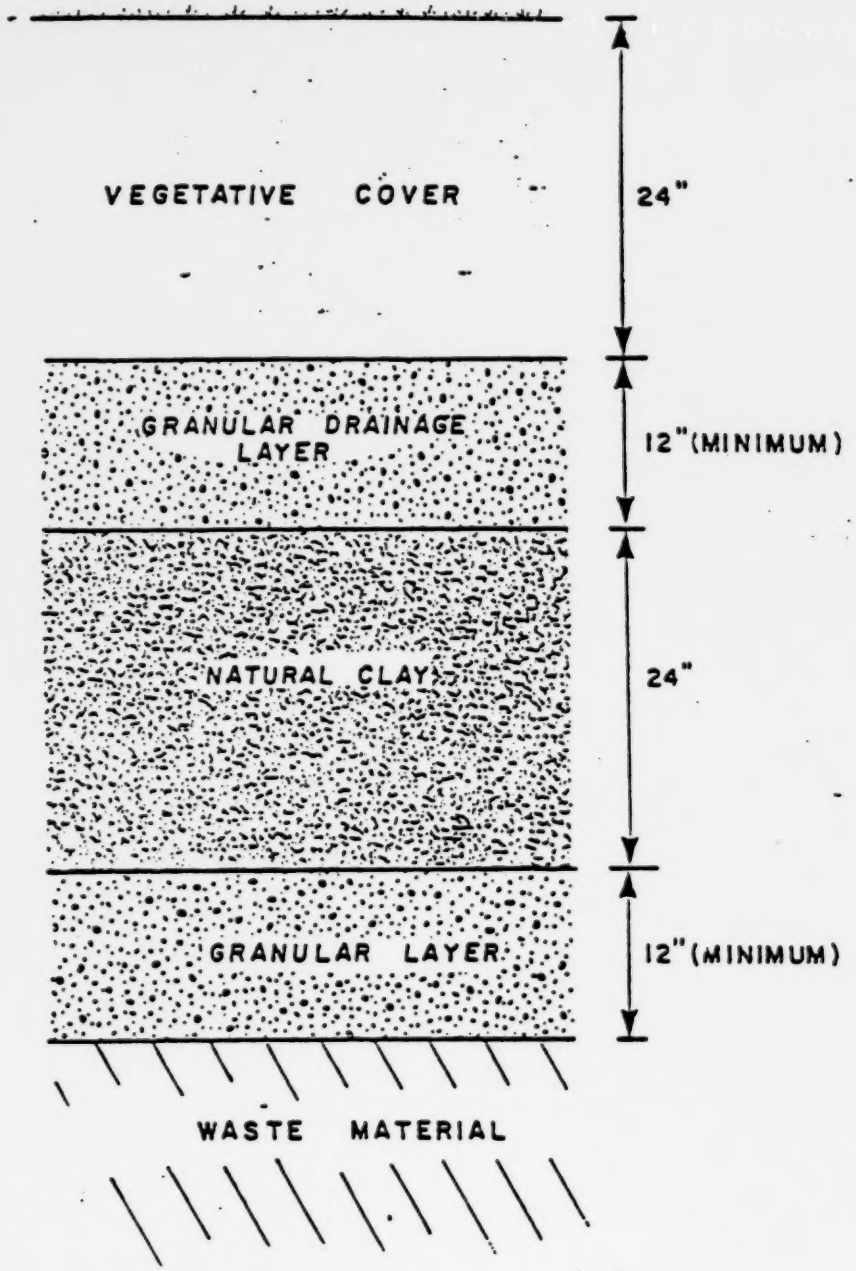
Alternative 1C would not be consistent with the technical requirements of the Resource Conservation and Recovery Act (RCRA). In particular, RCRA requires that waste and waste residues to be removed at closure or capped as a landfill. Also, this alternative does not meet the RCRA groundwater protection regulations in 40 CFR § 264, which require cleanup to background, MCLs, or ACLs.

Without effective source control, it is likely that on site and downgradient groundwater quality would remain at levels on the same order as currently observed for the next 20 to 30 years. The more concentrated portion of the marsh VOC plume east of Route 125 would continue to migrate and would be anticipated to reach Country Pond in approximately 3 years. The capital cost is estimated to be $202,000. The annual operation and maintenance cost (O&M) is estimated to be $133,000. The present worth is $1,029,000, assuming a 10 percent discount rate.

Alternative 7 - GLCC Site Cap; O&G Source Excavation and Relocation; Upgradient Groundwater Interceptor Trench; and On-Site Aeration or Disposal of Highly Contaminated Soil, Waste and Sediments.

Alternative 7 includes GLCC site capping, O&G source excavation and relocation, construction of an upgradient groundwater interceptor trench, and on-site aeration or treatment of highly contaminated soil, waste, and sediments as source control measures. GLCC site capping would be performed consistent with RCRA technical standards. The upgradient trench is intended to maintain groundwater levels within the GLCC site at or near seasonal low levels. In addition, this alternative includes the land use controls and environmental monitoring program as described in Alternative 1C.

Construction of a GLCC site cap and interceptor trench would significantly reduce the infiltration of precipitation into the site soils, and reduce the rate of groundwater migration across the GLCC site. Figure 4, which is a conceptual RCRA cap profile, shows that a cap would provide a minimum of 6 feet of clean



RCRA CAP PROFILE (CONCEPTUAL)

O &G/GLCC SITE

KINGSTON.N.H.

FIGURE 4

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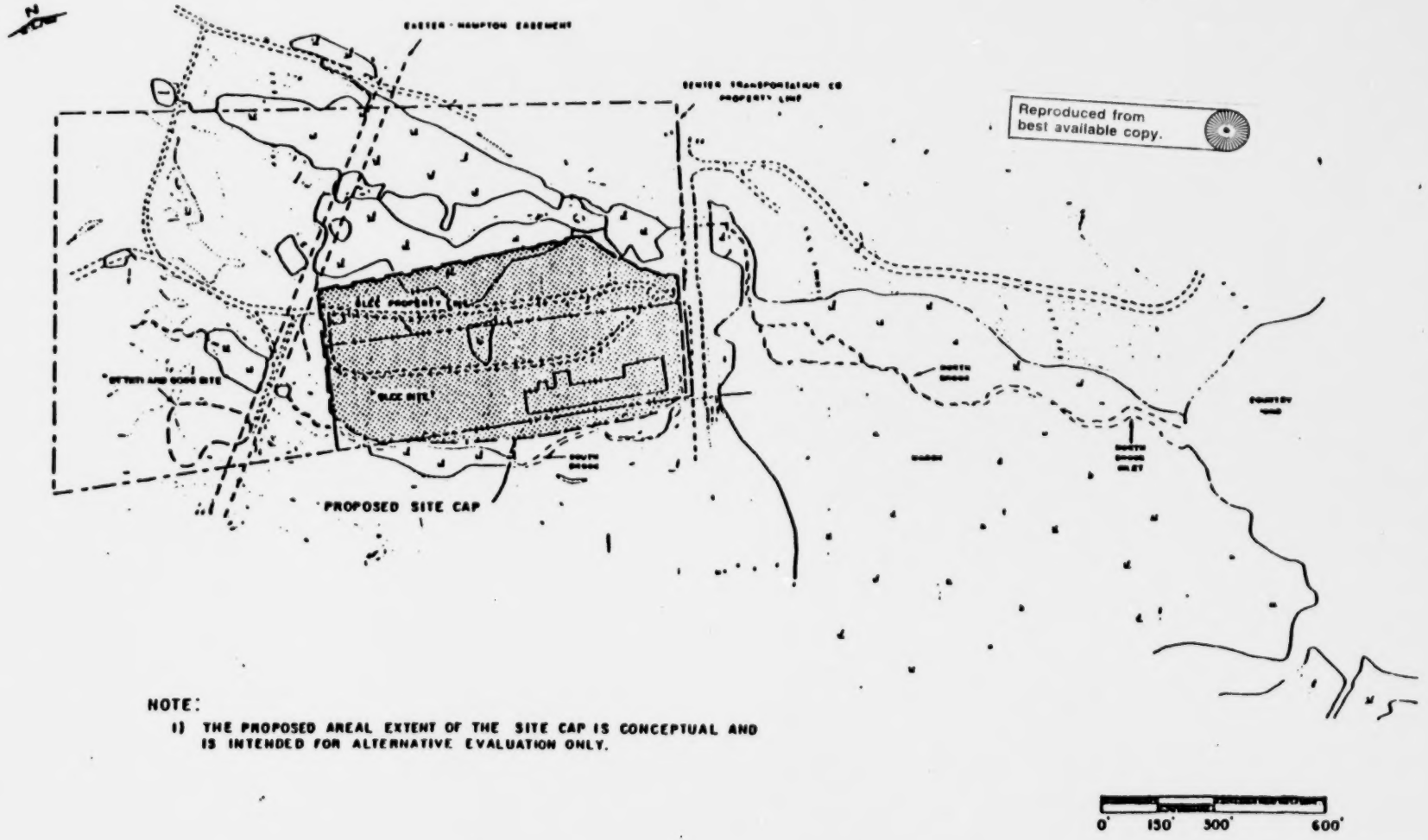


NOTE:

1) THE PROPOSED AREAL EXTENT OF THE SITE CAP IS CONCEPTUAL AND IS INTENDED FOR ALTERNATIVE EVALUATION ONLY.

PROPOSED AREAL EXTENT OF SITE CAP

O &G/GLCC SITE
KINGSTON, N.H.

FIGURE 5

material as a barrier between on-site contaminants and the ground surface. With proper maintenance, the useful life of a RCRA cap is considered to be at least 30 years. The proposed areal extent of the site cap is shown on Figure 5. The cap area would be the same under Alternatives 7, 12, and 13.

On-site disposal or aeration would involve excavation and removal of highly contaminated waste, soil and sediments from identified source areas. Materials with total VOC concentrations greater than 1 ppm, and less than 50 ppm of PCBs, would be aerated to reduce total VOC concentrations to less than 1 ppm before placement beneath the GCCC site cap. Materials with greater than 50 ppm of PCB's, would either be placed within a newly constructed on-site double-lined RCRA landfill or transported off-site to a licensed PCB treatment or storage facility. The decision to dispose the PCB material on-site or off-site would depend on the relative costs as well as environmental, public health, and institutional consideration. Figure 6 shows the identified areas for source removal which would apply for Alternatives 7, 12, 13, and 14.

Alternative 7 is expected to have significant long-term environmental benefits beyond the no action alternative. Exposure of biota to on-site contaminants would be effectively eliminated through on-site source control measures, particularly site capping, which would place a 6-foot thick barrier of soil between wastes and the ground surface. By capping contaminated soil on-site, off-site transport of contaminated sediments to North or South Brook would be effectively eliminated. This should eliminate further accumulation of PCB-contaminated sediments in South Brook, halt the further deposition of PCB-contaminated sediments in the marsh, and limit the off-site transport of VOC's and heavy metals by the surface water pathway. By limiting the transport of contaminants to these surface water resources, it is expected that the adverse impacts on both the surface water flora and fauna would be reduced.

There would be a direct impact to the South Brook wetland from channelling South Brook. Construction of the lined open channel would entail destruction of approximately one acre of wetland area along with flora and biota living within the South Brook wetland channel. Site reconnaissance of the South Brook wetland area indicates that oak, red maple, low bush small cranberry, princes pine, check berry, white pine, eastern hemlock, maple leaf viburnum, and partridge berry could all potentially be adversely affected or destroyed within the limited area. The site reconnaissance also indicates that the South Brook wetland does not support a large fish or wildlife population.

Adverse impact to portions of the South Brook wetland outside of the main channel can be limited by careful liner construction which would be confined primarily to the channelled area. It is likely that, over time, some vegetation would be naturally re-

established in the channel and along edges of the channel previously disturbed by liner construction operations. Therefore, considering the small area and observed limited functional value of the South Brook wetland as discussed in the wetlands assessment, the overall impact is limited.

PCB sediments in South Brook east of Route 125 would be removed and contained on-site in a RCRA landfill. The total quantity of PCB sediments east of Route 125 is estimated to be approximately 50 cubic yards, and is estimated to extend approximately 100 feet out into the marsh. Therefore, the impact to the marsh wetland is anticipated to be minimal.

Construction of the site cap would entail destruction in the southern portion of the North Brook wetland area on-site. Because very little vegetation beyond sparse grasses and light bush was observed within this limited area, the impact to the North Brook wetland is considered insignificant. No construction would be required elsewhere in the North Brook wetland.

North Brook and South Brook surface water quantities would increase as a result of runoff from the capped area. The increase in runoff is anticipated to have a beneficial impact to both wetland areas via provision of additional water. North Brook and South Brook surface water quality would also be improved by effectively eliminating offsite transport of contaminated surface runnoff and by channelling South Brook.

Groundwater intercepted by the interceptor trench will be discharged to South Brook, resulting in increase surface water flow to the Country Pond area at this point. It is anticipated that discharge from the interceptor pipe will be on the order of 5 gpm. Considering the large size of the marsh, it is anticipated that only beneficial impacts, if any, would result from this small additional discharge of clean water.

Impact of the wetland areas due to sedimentation from excavation and construction activities is anticipated to be insignificant if proper erosion and sedimentation controls, including siltation fences or temporary siltation ponds, are carefully constructed.

Limiting excavation and construction activities to drier times of the year would also serve to limit erosion and sedimentation. By reducing further contaminant contributions to site groundwater, natural attentuation processes would gradually improve on-site and downgradient water quality. It is estimated that maximum VOC concentrations in the wetlands would be reduced by approximately an order of magnitude within a period of 20 to 30 years after institution of effective on-site source control measures. In the meantime, conditions discussed in the baseline wetlands assessment would likely prevail.

During this period and beyond, overburden groundwater resources within and in the vicinity of the estimated limits of plume migration would remain unusable. Overburden groundwater contamination within this area would continue to provide a potential source of degradation of bedrock aquifers in the area.

Alternative 7 would allow the concentrated portion of the VOC contaminant plume within the wetlands to continue its easterly migration toward Country Pond. The projected impact of this portion of the plume on Country Pond would result in further degradation of Country Pond sediments, water quality, and biota. As discussed in the baseline risk assessment, this impact would likely result in detectable levels of VOC's in Country Pond surface water (10 to 100 ug/l) as well as increased exposure levels to Country Pond biota and fauna.

The RCRA cap and landfill would be designed consistent with RCRA technical standards. Since hazardous wastes would remain on-site, both closure and post-closure requirements for a hazardous waste disposal facility, 40 CFR § 264, Subpart G, and 40 C.F.R. § 264.310 would be relevant and appropriate. This alternative does not comply with RCRA groundwater protection regulations, 40 CFR § 264, Subpart F, since this alternative does not provide for a corrective action program to address existing groundwater contamination at the site. RCRA siting standards for a disposal facility (40 CFR § 264.18) include requirements that the site be located outside a 100-year floodplain and more than 200 feet from an active fault would be applicable to the on-site landfill. These requirements are likely achievable at the site. However, because PCB-contaminated soils (greater than 50 ppm) would be disposed on-site, disposal would also be subject to mroe stringent requirements set forth in the Toxic Substance Control Act (TSCA - 40 CFR § 761).

In addition to RCRA requirements, PCB waste landfill under TSCA is required to have a 50-foot separation distance between the landfill liner and the seasonal high groundwater table (40 CFR § 761.75(b)(3)). This requirement could not be met at the O&G/GLCC site, where the seasonal high groundwater table is generally within 5 feet of ground surface. Exceptions to this requirement can be granted provided that no consequent adverse impacts be demonstrated.

Because the removal of contaminated sediments from the wetland is provided for, Alternative 7 would be in compliance with Executive Order 11990 (wetlands). Further, no designed discharge of waste is anticipated to occur to the wetland.

The capital cost is estimated to be $4,150,000. The annual O&M costs are estimated to be $193,000. The present worth is $5,543,000 assuming a 10 percent discount rate.

Alternative 12 - GLCC Site Cap; O&G Source Excavation and Relocation; Groundwater Extraction and Treatment; Upgradient Groundwater Interceptor Trench; Limited On-Site Aeration or Disposal of Highly Contaminated Soils, Waste, and Sediments. The GLCC site cap, O&G source excavation and relocation, a groundwater interceptor trench, and on-site disposal and treatment of source materials discussed previously for Alternative 7 would be provided as source control measures. To mitigate the effects of contaminants which have already entered the groundwater, a groundwater extraction and treatment program would be undertaken.

Groundwater extraction and treatment is a common and successful remedial technology at hazardous waste sites. The areas that groundwater would be extracted from are the same as those previously described under Alternative 8. The proposed groundwater treatment train shown on Figure 7 was developed specifically for the O&G/GLCC site. The useful life of this alternative is expected to be at least 30 years. Assuming effective source control, groundwater reclamation goals, once achieved, should last indefinitely. The operation and maintenance requirements (O&M), however, for groundwater extraction and treatment are much greater than for Alternatives 1C and 7. Additional environmental benefits and concerns relevant to Alternative 12, beyond those of Alternative 7, are discussed below.

Soils: Environmental pathways associated with on-site soils would be significantly reduced through construction of a RCRA cap and O&G source excavation and relocation.

Air: Groundwater treatment would likely result in volatile organic air emissions due to the air stripper. However, these emissions could be controlled with a vapor recovery unit. Other treatment processes are not expected to have significant air emissions.

Wetlands: Construction of an access roadway for drilling of groundwater extraction wells could adversely affect the marsh wetland area via destruction of wetland vegetation beneath the roadway fill. Characteristic plant species observed in the marsh wetland including highbush bluberry, white oak, red maple, reeds, cattails, and meadow sweet could all be impacted. It is unlikely that construction of an access roadway would adversely impact flood storage of the marsh wetland due to the relatively limited areal extent of the roadway fill and the anticipated east-west roadway alignment which would not serve to dam water behind the fill. Further assessment of the roadway impact on the marsh during the pilot scale design phase may be warranted. If further studies indicate detrimental impact, the roadway could be excavated from the marsh, and marsh vegetation reestablished once groundwater extraction and treatment has been completed.

Groundwater: While the actual extent of groundwater reclamation would be established through institutional requirements discussed below, groundwater quality beneath and downgradient of the site would be substantially improved. Contaminated groundwater that is likely to be discharged to Country Pond and the North Brook inlet would be reduced as would further off-site plume migration during the life of the groundwater extraction program.

Reducing overburden groundwater contamination, as well as performing limited on-site groundwater extraction from bedrock, would reduce future exposure of bedrock groundwater to site contaminants. In addition, overburden extraction and on-site source control actions, would reduce the potential for downward hydraulic gradients that would otherwise cause contaminant migration into bedrock.

Surface Waste: By intercepting contaminated groundwater prior to its discharge into Country Pond, contaminant levels in Country Pond water and sediments would likely remain at levels similar to those presently observed.

In addition to the institutional requirements previously discussed for Alternative 7, additional requirements for groundwater extraction and treatment would be satisfied. This alternative would allow RCRA groundwater protection regulations, 40 CFR § 264, Subpart F, to be met, which would not be achievable under Alternative 7.

The Clean Water Act would be applicable to surface water discharge of treated groundwater. The technical requirements for obtaining a NDPES permit for discharge to surface water would likely prevail prior to such a discharge being implemented. The decision to select surface water discharge of treated effluent instead of groundwater discharge would be made from groundwater treatability studies.

The capital cost is estimated to be $6,713,000. The annual O&M cost is estimated to be $948,000. The present worth is estimated to range between $10,499,000 for a treatment duration of 4 years to $14,959,000 for a treatment duration of 25 years.

Alternative 13 - GLCC Site Cap; O&G Source Excavation and Relocation; Groundwater Extraction and Treatment; Upgradient Groundwater Interceptor Trench; limited Excavation and On-Site Treatment or Disposal of Highly Contaminated Soils, Waste, and Sediments.

Alternative 13 is identical to Alternative 12 with the addition of the immediate development of the alternate water supply system for the area 1 mile west of the site and 1.5 miles north, south, and east of the site.

Anticipated environmental impacts of the response are similar to those discussed for Alternative 12. In addition, the construction of an alternate water supply system would effectively eliminate risks associated with ingestion of and washing in contaminated groundwater. Also, eliminating the withdrawal of bedrock groundwater within the study area would prevent diversion of contaminated groundwater to new or existing bedrock wells, reducing the risk of migration of contaminants with bedrock groundwater.

The implementability of the proposed water supply system cannot be fully assessed until the hydrogeologic studies are completed. There is no assurance that a suitable overburden groundwater resource would b found within the immediate area. If this were the case, a groundwater resource some distance away from the study area would have to be considered. Water may have to be purchased and transported from the nearest existing municipal water supply system in Exeter, NH or Haverhill, MA, which are approximately 10 miles away.

An additional environmental concern would be the short-term inconvenience to area residents during installation of water distribution pipes. The disruption would include noise and dust from construction operations.

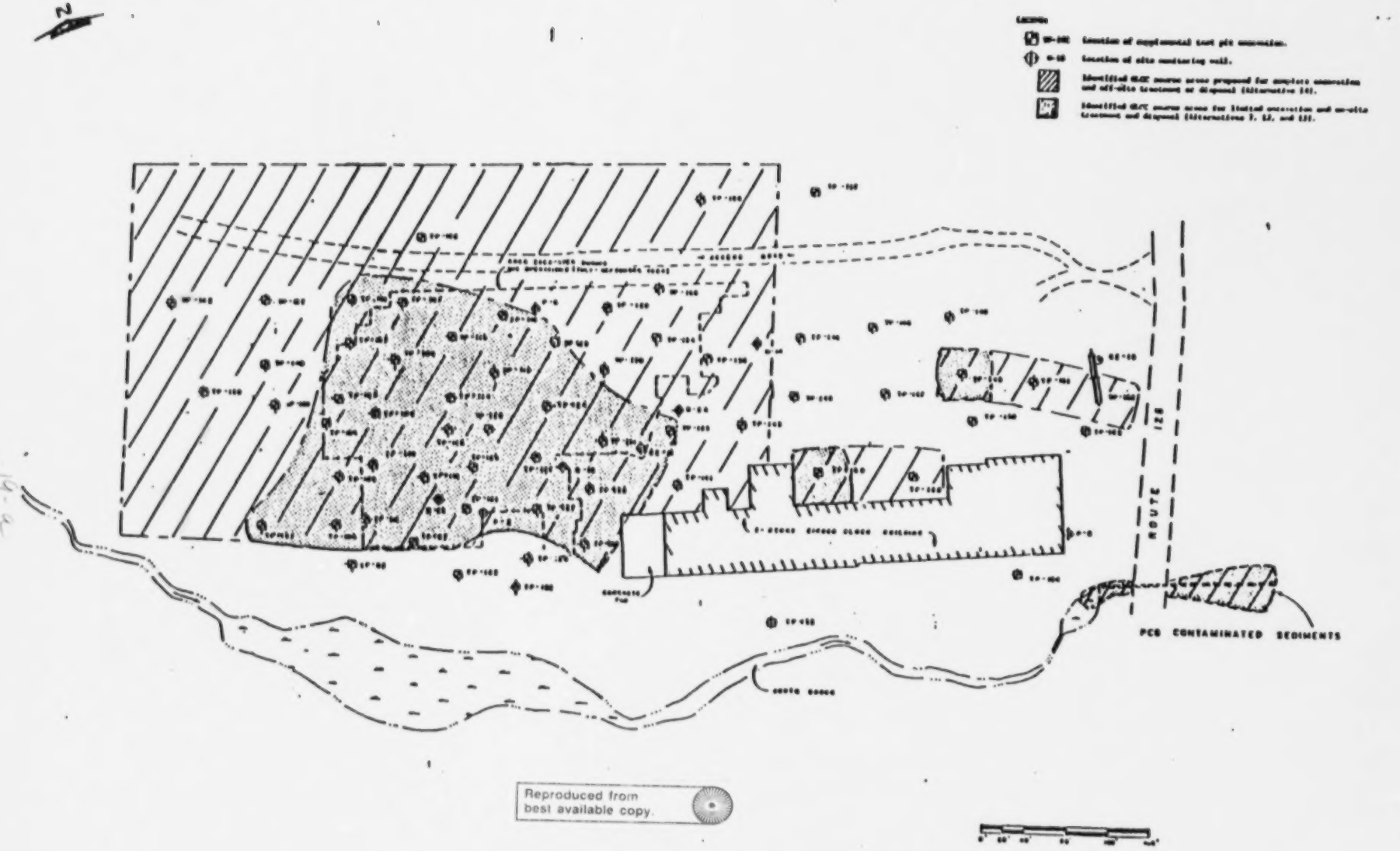
In addition to the institutional requirements specified under Alternative 12, an alternate water supply would also be subject to drinking water standards promulgated under the Safe Drinking Water Act (SDWA).

The capital cost is estimated to be $10,787,000. The annual O&M cost is estimated to be $913,000. Variations in the durations of groundwate extraction and treatment result in a present worth ranging between $14,358,000 (4 year duration) and $19,130,000 (25 year duration).

Alternative 14 - Complete Removal of On-Site and Off-Site Hazardous Soils, Wastes and Sediments to an Off-Site RCRA Facility. This alternative would involve the complete removal of all contaminated on-site and off-site soils (marsh sediments). Based on available test pit data, approximately 54,000 cubic yards of contaminated soils, waste, and sediments would be excavated and transported off-site in accordance with RCRA standards to a licensed RCRA treatment, storage, or disposal facility. This alternative would also include the demolition of existing site structures and removal of underlying contaminated soils. The extent of the area to be excavated is shown in Figure 6.

The removed material would be replaced by an equal volume of clean soil. Following soil replacement, the site would be graded, loamed, and seeded.

With the complete removal option, less stringent land use controls may be appropriate. For instance, limited on-site development may be considered but there may be no need for a security fence.



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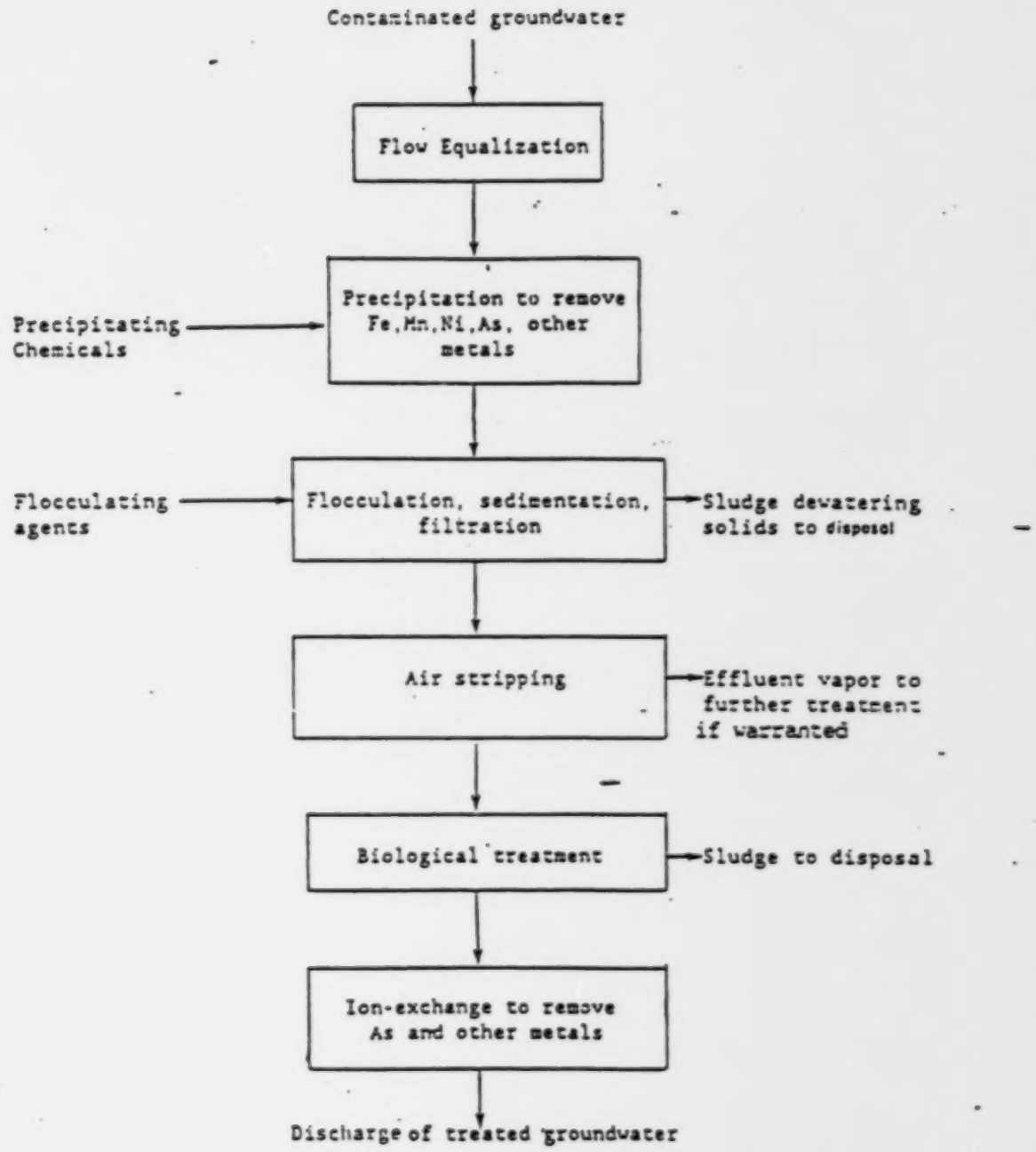
IDENTIFIED AREAS FOR SOURCE REMOVAL

O &G/GLCC SITE
KINGSTON, N.H.

FIGURE 6



GROUNDWATER TREATMENT TRAIN (CONCEPTUAL)

FIGURE 7

O &G/GLCC SITE
KINGSTON, N.H.

Environmental effects of Alternative 14 are similar to those discussed for Alternative 7. Additional impacts are discussed below.

The complete removal of surficial soils from the site would be a substantial operation that would require extensive on-site activity. This on-site activity would require careful management to control the discharge of VOC's and fugitive dust to the air. Protection of the environment would be addressed through an air monitoring program as well as through control of excavations.

A potential concern would be possible off-site environmental impacts due to the transport of waste materials to a suitable RCRA/TSCA facility. Considerable off-site transportation of waste materials would occur, with the potential risk of accidents that may result in discharge of contaminated materials to the environment. It is estimat that 2,500 truckloads of contaminated material would leave the site onto Route 125.

Alternative 14 is a complete removal option. From a public health and environmental perspective, this alternative is similar to Alternative 7, in that the on-site contaminant source would be effectively eliminated. Off-site contaminants, with the exception of contaminated sediments, would largely be left as is.

This alternative would create greater risk of short-term exposures than Alternative 7. The large amount of excavation and transport of contaminated materials could result in particulate and vapor dispersion. This risk could be addressed through design of excavation procedures and an air monitoring program.

The off-site transportation and disposal operations under this alternative would be subject to RCRA regulations 40 CFR § 262 and 263, and in the case of PCB contaminated soils, 40 CFR § 761 of the TSCA regulations. Relevant RCRA and TSCA regulations include requirements for containerization, manifesting, and transportation of excavated materials. The excavation operations would be conducted in accordance with relevant OSHA regulations. The removal operations may also be subject to disposal facility closure requirements, 40 CFR § 264, Subpart G.

Alternative 14, however, would not be consistent with RCRA groundwater protection regulations, 40 CFR § 264, Subpart F, since the existing on-site and off-site groundwater contamination would not be addressed.

The capital cost is estimated to be $33,878,000. The annual O&M cost is $133,000. The present worth is $34,705,000, assuming a 10 percent discount rate.

Alternative 15 - Excavation and On-Site Treatment of Contaminated Soils, Wastes and Sediments; Groundwater Extraction and Treatment. This alternative would involve the excavation of contaminated material from the entire O&G/GLCC site, and on-site treatment of these contaminated materials via incineration. All soils, wastes, and sediments

containing PCB concentrations greater than 50 ppm and VOC concentrations greater than that deemed "acceptable" would be incinerated. The selected level of acceptable residual soil contamination would be based upon the evaluation of the corresponding estimated cancer risk for the leaching of residual contamination from on-site soils and migration of contaminants in the groundwater to the marsh/pond interface.

Estimates of the quantities of contaminated material that must be excavated to achieve an acceptable on-site residual soil contamination level were made by employing a two-phased contaminant transport model. Additional soil survey studies would be required to accurately assess the extent of contaminated soils. Nevertheless, the following estimated residual soil contaminant concentrations and excavation quantities are considered useful for order of magnitude estimates, and are summarized for comparison purposes.

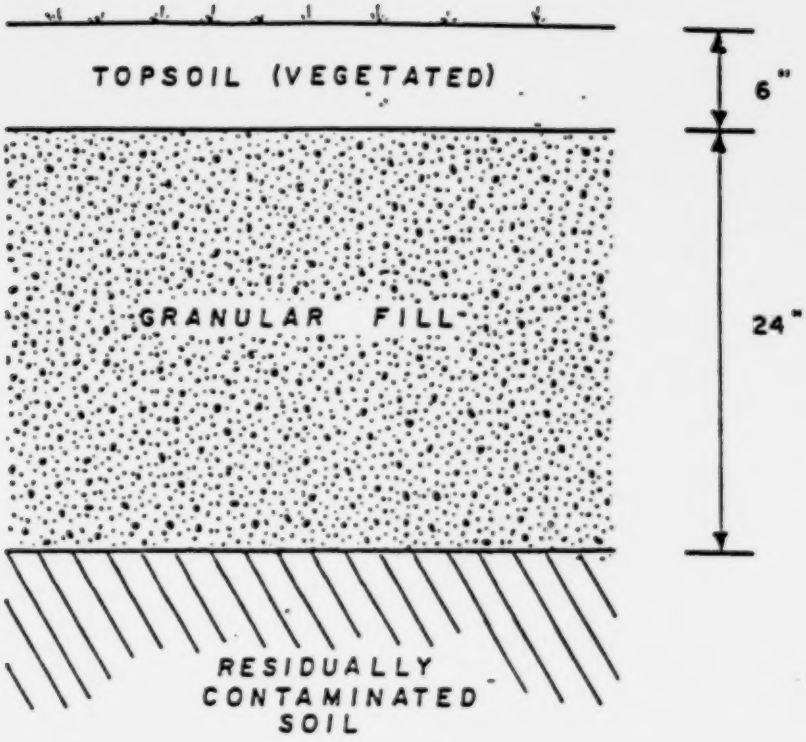
Estimated cancer risk level at the marsh/pond interface	Estimated total residual VOC concentration in on-site soils (ppb)	Estimated amount of soil to be excavated on-site (cubic yards)
10^{-4}	70,000	12,000
10^{-5}	7,000	18,000
10^{-6}	700	25,000
10^{-7}	70	54,000

Once excavation and incineration operations are completed, the site would be graded and covered. Figure 8 shows a conceptual profile of the site cover.

In addition to the source control measures described above, Alternative 15 includes groundwater extraction and treatment. The locations of groundwater extraction wells and the treatment processes would be the same as described for Alternative 12. However, the groundwater treatment goals would include a consideration of the on-site soil contamination treatment goals; i.e. groundwater treatment goals corresponding to a range of cancer risk levels attributed to the groundwater at the marsh/pond interface.

The following minimum number of contaminated aquifer volumes and extraction/treatment times were estimated to be required based on simple dilution theory and are considered useful for order of magnitude comparison purposes.

Estimated Cancer Risk Level at Marsh/Pond Interface	Estimated Number of Contaminated Aquifer Volumes to be Pumped and Treated	Estimated Minimum Treatment Time (years)
10^{-4}	2 - 3	2 - 3
10^{-5}	3 - 5	3 - 5
10^{-6}	5 - 7	5 - 7
10^{-7}	7 - 10	7 - 10



- NOT TO SCALE -

SITE COVER PROFILE (CONCEPTUAL)

FIGURE 8

O &G /GLCC SITE
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No additional environmental impacts are anticipated beyon those already discussed for each respective response action in previous sections.

Alternative 15 involves the reduction of on-site soil and groundwater contamination to residual contaminant concentration levels within a defined risk level.

Also, the extraction and treatment of groundwater would reduce increased risk due to contaminant migration through the aquifer to a level consistent with the degree to on-site source control.

Depending on the level of residual soil contamination that will remain on-site, RCRA closure and post-closure requirements may be appropriate. This alternative would also be subject to the requirements for groundwater extraction and treatment previously discussed under Alternative 12. Also, this on-site incineration alternative would have to satisfy 40 CFR § 264. In particular, Subpart O of this regulation in regard to incinerators would apply.

The capital cost of this alternative ranges from $12,073,000 for an estimated 10^{-4} cancer risk to $25,723,000 for an estimated 10^{-7} cancer risk, while the annual O&M is estimated to be $893,000. The present worth of this alternative ranges from $14,825,000 to $31,236,000.

RECOMMENDED ALTERNATIVE

Section 300.68 (i) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and welfare and the environment.

In order to meet the objectives of site remediation, both a source control remedy and a groundwater remedy are necessary since neither can provide adequate protection of public health, welfare and the environment without the other.

EPA has determined that the following combination of source control and groundwater remedies meets the governing legal requirements:

Source Control Remedy

The removal of contaminated soil (source control) is necessary to minimize the migration of contaminants into groundwater and any risk associated with direct contact with these soils.

The selected source control remedy involves excavation of approximatel 19,000 cubic yards of contaminated soil and treating these soils on-site. Soils with PCBs levels above 20 ppm will be incinerated. (Based on available data this is thought to be approximately 5000 cubic yards). Soil with less the 20 ppm PCB but with concentrations of total volatile organics compounds (VOCs) above 1 ppm will be treated by an aeration process which will reduce the VOC's to acceptable levels. This process will also provide for positive controls on any releases of these contaminants to the atmosphere such that any emmissions are protective of public health and the environment. The "low temperature thermal stripping" system similar to that being piloted at the McKin CERCLA site in Gray, Maine, is recommended for use at this site (Based on available data this is estimated that approximately 14,000 cubic yards will be treated in this manner).

Incineration is a proven treatment process for PCBs and other organic compounds. Incineration is a high temperature process that results in most cases in the destruction to insignificant levels of the compounds. The costs and level of treatment provided by incineration are not warranted for all contaminated soil at the O&G/GLCC. The treatment time and the cost make it cost effective and protective of public health and the environment to treat the low-level and non-PCBs soils by aeration.

The aeration (low temperature thermal stripping) process recommended is considered an innovative or advanced technology because of its lack of timed field demonstration. The evaluation of this system in terms of engineering reliability implementation and constructabilit (40 C.F.R. §300.68 (h)(2)(iii)) has revealed this alternative to be technically sound; it is expected to be appropriate to reliably minimi present or future threats to public health or welfare or the environme

(40 C.F.R. §300.68(h)(2)(v)). The results of several pilot studies at heavily contaminated defense facilities have demonstrated a greater than 99.99% removal of volatile organic compounds from contaminated soils. Aeration is increasingly being used for the clean-up of volatile organic contaminated soils at several industrial and defense sites. The McKin CERCLA site in Gray, Maine is successfully utilizing this process in pilot scale and a similar process has been selected for soil treatment at the Metaltech Aerosystems NPL site in New Jersey. In addition, this system is also being considered at the Tinkham's Garage Site in Londonderry, NH.

The areas of excavation of the soils from the O&G site and from the areas of GLCC site are shown in figure 6. The cost estimate for the source control remedy can be found in Table 6.

Total volatile organic contaminants (VOCs) and PCBs will be used as indicators for excavation for the soil for remediation. Clean-up levels for the soil contamination are based on aquifer remediation goals and direct contact risk. The soil clean-up levels for VOCs are intended to result in the minimization of the potential for further releases to groundwater. The soil clean-up levels for PCBs are health and environmentally based.

EPA's rationale for selection of 1 ppm for total volative organic contaminants as a source control "action level" is based upon the information and data presented in the RI/FS regarding soil and groundwater contamination. Based upon the relative concentrations of the contaminants of concern, identified in this section, and the TVOC concentrations found in the groundwater and on-site soils, EPA believes that this level is consistent with the groundwater remediation goals. In addition the 1 ppm level is one which can be readily and efficiently attained and monitored using standard field instrumentation and construction techniques. The FS states that based on existing data 14,000 cubic yards of VOC contaminated soil above 1 ppm or 50 ppm PCBs lie within the identified source areas. The FS conservatively estimates an additional 5,000 cubic yards will be identified during the pre-excavation soil survey. The soil excavation volume is approximate and is based on limited field data. EPA believes that the volumes to be excavated based on the target levels, 1 ppm VOCs and 20 ppm PCBs will be approximately 19,000 cubic yards. Refinement of the estimate will be performed during the pre-excavation soil survey which will be conducted as the first phase of the source control. Should the results of this survey indicate that the contaminant distribution is such that the 1 ppm TVOC level is not appropriate, EPA will reevaluate this portion of the remedy.

Remediation of soil source areas will be evaluated in terms of the reduction in levels of VOCs with the underlying assumption that treatment to the target level for this parameter will result in nonhazardous levels of other contaminants.

The site will be graded, filled as necessary, covered and revegetated to insure that the migration of any residual contamination will be minimized and to prevent direct contact. The proposed cover design is shown in Figure 8. The extent of the area to be covered will be determined after the pre-excavation survey. Relevent post-closure requirements of RCRA will be performed: groundwater monitoring, site inspection and site maintenance.

Post-closure activities are felt to be necessary due to the inability to totally remove all areas of contaminated soil. Implementation of the remedy will include on-site sampling utilizing a grid system, with frequency and grid size to be determined during design, based on previously collected data.

The soil treatment will be performed consistent with applicable or relevant and appropriate requirements. The incineration of the PCB contaminated soil will be performed consistent with RCRA 40 CFR 264 Subpart O and TSCA 40 CFR 761.70. A test burn will be performed prior to full scale operation.

Air emission testing will be conducted during the test burn and ash samples will be analyzed following the completion of the test burn to confirm that both are protective of public health and the environment. The test burn will be designed to operate under worst case conditions to conservatively represent full-scale incineration emissions and ash content. The test burn will be designed to include each of the various soil types (including a soil sample from the most contaminated areas on the site) and will be carried out in full compliance with relevant state and federal requirements. Treatment of the PCB contaminated soil will be consistent with the excavation criteria of 20 ppm. The excavation criteria of 20 ppm has been determined to be at a risk level that is appropriately protective of public health and the environment for this site. Based on the data obtained during the trial burn, a demonstration will be performed consistent with the RCRA delisting evaluation procedures.

Attached to this ROD are the assumptions and calculations utilized to formulate the health based soil clean-up level for PCBs. EPA feels that the assumptions and factors utilized to calculate the recommended health based excavation criteria of 20 ppm are appropriate for this site and are consistent with EPA draft guidance (Development of Advisory Levels for Polychlorinated Biphenyls (PCBs) Cleanup" prepared by the Exposure Assessment Group, Office of Health and Environmental Assessment 5/86).

The excavation level for the PCB contaminated sediment will be 1 ppm, which EPA has determined to be necessary because it conservatively reflects concentrations that could occur in fish and other aquatic organisms. The use of a conservative limit is necessary due to the potential for bioaccumulation in the food chain.

The proposed aeration process is an enclosed system and air emissions will be controlled. The aeration transfers the contaminants to an air stream which then passes through a fume incinerator or after burner. It is expected that the burner will destroy up to 99.99% of the contaminants. The vented air stream will then be vented to a stack. The air generated will meet applicable RCRA air emission standards.

The soil aeration will be performed consistent with RCRA requirements. As stated for PCBs the soil treatment level will be based on the excavation criteria, of 1 ppm for total volatile organics. Based on the results of the pilot study a demonstration will be performed consistent with the RCRA delisting procedures that the treatment residual is safe for placement at the site. The treatment system will be operated at peak efficiency and VOC removal should in most cases exceed the excavation criteria. A pilot study will be conducted to demonstrate whether the aeration process and its air release controls are effectively removing the contaminants and to ensure that the air emissions and the residual soils are protective of public health and the environment. The pilot study will be designed to operate under worst case conditions to conservatively represent full scale operation. The pilot study will be designed to include each of the various soil types (including a soil sample from the most contaminated area on the site) and will be carried out in full compliance with relevant state and federal requirements.

EPA will perform an evaluation based on the results of the incinerator and aeration pilot studies to verify the costing data used in the feasibility study and any additional costing data used in preparation of this ROD. EPA will make a determination based on the costing data from the pilot studies that it is cost-effective to treat the low PCB soils by aeration.

PCB contamination in on-site wetlands (including portions of South Brook at Route 125) above 1 ppm will be excavated. This will result in short term adverse impacts on the wetlands. However, this impact is not considered significant and wetlands are expected to recover quickly. This will result in compliance with Executive Order 11990 and the Fish & Wildlife Coordination Act.

In addition to the legal requirements discussed elsewhere, the Clean Air Act and Executive Order 11990 (Protection of Wetlands) are applicable or relevant and appropriate.

The estimated capital and operation and maintenance costs for this remedy can be found in Table 6.
The implementation of this remedy will be as follows:

- Decontamination and removal of existing site structures.

- Design and implementation of soil sampling plan to determine areas and depths of excavation.

- Excavation of approximately 19,000 cubic yards of soils above the target levels of 20 ppm of PCBs or 1 ppm of VOCs.

- Excavation of sediment in South Brook and marsh areas to 1 ppm of PCBs.

- Ambient air quality monitoring during remedial activities to ensure that offsite pollutant concentrations do not reach unacceptable levels. A detailed monitoring program including onsite action levels, site perimeter monitoring, and collection of meteorological data will be performed.

  Acceptable site perimeter levels and onsite action levels will be developed based on applicable standards and guidance from EPA and the Centers for Disease Control. Action levels are the ambient levels which will trigger specific responses such as applying additional control measures to the remedial processes or that may temporarily cause activities to cease at the site.

- Treatment by incineration of all soils with PCBs above the target level of 20 ppm. Prior to full scale incineration a trial burn will be performed to demonstrate that ash levels and air emissions will be protecti e f public health and the environment.

- Treatment by aeration (low temperature thermal stripping) process of approximately 14,000 cubic yards. Prior to full-scale operation of the aeration system a pilot study will be performed to demonstrat that treatment levels and air emissions are protective of public health and the environment.

- Evaluation of the incineration test burn and aeration pilot study will include a cost-effectiveness analysis to ensure that the costs utilized as a basis for this ROD were appropriate. In the event the cost data needs to be revised a determination will be made whether aeration is cost-effective given the need to incinerate the PCB contaminated soil.

- Treated soil will be replaced and regraded. The site will be covere to provide adequate drainage,minimization of infiltration and protection from direct contact.

- On-site and off-site water quality monitoring will be performed to verify that the major source areas have been sucessfully excavated.

- Post-closure care including site inspection and maintainence will be performed.

Management of Migration Remedy

The chosen remedy involves the removal/extraction of contaminated groundwater and the onsite treatment with discharge back to the groundwater. A description of this remedy is as follows:

- extraction of contaminated groundwater from the following areas:
  (a) contaminant source areas on the O&G/GLCC site, including the O&G site, the caustic lagoon, Kingston Swamp, and the area east of the GLCC building;
  (b) Route 125;
  (c) The marsh area downgradient of the GLCC Site;
  (d) From the deep bedrock well R-4 near the border of the site with Route 125.

- Extracted groundwater will then be treated onsite to meet the State of New Hampshire requirements, Part 410, Protection of Groundwater, N.H. Code of Administrative rules. The treatment components will be determined during design after the performance of treatability studies. The treated groundwater will then be discharged back to the groundwater on-site to the extent technically feasible. Additional discharge will be to surface water and will meet the relevant water quality criteria and National Pollutant Discharge Elimination System (NPDES) requirements.

- Groundwater extraction and treatment will proceed for five years, from the date of implementation. Upon achievement of the target levels or five years, whichever is sooner, an evaluation will be performed to insure that the target compounds were appropriate and if the target levels have not been achieved if they are technically feasible. Achievement of the target levels will be defined as continuously meeting target levels for identified contaminants of concern for a period of 3 years at the Route 125 monitoring boundary and at the onsite monitoring wells that are selected during design to determine onsite water quality.

- Monitoring of wetlands onsite will be conducted to insure no detrimental impacts from the extraction of groundwater for treatment. If negative impacts are observed, the rate of groundwater removal will be decreased to the point that these wetlands are not adversely impacted.

- Onsite and offsite monitoring will be implemented consistent with RCRA §264.100(d), which requires the establishment of a monitoring program to assess the impact of the remedial alternative.

- Off-site residential wells will be monitored during the implementation of the remedial action. The frequency and parameters to be monitored will be determined during design.

Present worth, capital and operation and maintenance costing data can be found in Table 5. The costs developed for the groundwater treatment system were based on the various treatment units as shown on Figure 7. The final treatment scheme will be developed upon the completion of pilot and treatability studies.

It is EPA's policy to develop and evaluate groundwater remediation alternatives which will achieve cleanups within a lifetime cancer risk range of 10^{-4} to 10^{-7} (1 in 10,000 to 1 in 10,000,000). In the selection of an alternative and associated risk range, EPA typically takes into account the following factors:

1. site and groundwater characteristics

2. cost, reliability, speed, and technical feasibility of each alternative

3. current use and anticipated future need for the groundwater

4. effectiveness and reliability of institutional controls that might be used as part of a remedy

5. public acceptability of the options; and

6. ability to provide an alternative water supply

Based upon an evaluation of these factors, EPA has selected a risk range of 10^{-5} as appropriate for groundwater remediation at the Ottati and Goss/GLCC site.

In addition to the indicator compounds, the proposed treatment scheme provides for the treatment of arsenic and other metals as a result of sampling which showed elevated levels on-site. The need for the ion-exchange unit or a comparable unit to treat arsenic and other metals will be evaluated upon the completion of pilot studies.

The selection of indicator compounds to be utilized for aquifer clean-up is based on the relative composition of the contaminated groundwater, the toxicity of the compounds and their treatability. The calculation assumes additivity of risk and does not take into account interactions of compounds in a mixture. The following compounds will be utilized as indicator compounds at the site: 1,2 dichloroethane, trichloroethylene, tetrachloroethylene, and benzene.

The following table provides concentrations associated with a 10^{-5} risk level for each of the four contaminants of concern and individual and overall risk level associated with a 5 ppb concentration for each of the contaminants. This calculation is based on risk levels associated with the compounds from EPA's Office of Drinking Water and the Cancer Assessment Group (CAG) F.R. Vol. 50, No. 219, p. 46880-46933, November 13, 1985). The risk levels utilized are based on drinking water consumption only. The assumptions and calculations are consistent with the methodology in the Water Quality Criteria.

	Concentration Associated with 10^{-5} Risk Level	Cancer Risk Level Associated with 5 ppb
1,2 dichloroethane	3.8	1.3×10^{-5}
trichloroethylene	26	1.9×10^{-6}
tetrachloroethylene	6.7	7.5×10^{-6}
benzene	13	3.8×10^{-6}
		2.6×10^{-5}

EPA has determined it is necessary to remediate groundwater to the target levels both on-site and off-site. The Route 125 boundary and on-site wells to be selected during design will be used as the monitoring points to determine compliance with the target levels.

EPA has determined that treated groundwater discharge upgradient of the site is necessary, as recommended in the feasibility study. The discharge upgradient will aid in the efficiency of aquifer reclamation. In addition, upgradient groundwater discharge will reduce the risk of any potential impact of surface water bodies. Discharge to surface water would approach the natural brook flow rates (North and South Brook) and could result in an impact to either of the Brooks and/or the downgradient marsh.

In addition to the legal requirements discussed elsewhere, the applicable or relevant and appropriate Federal and State air requirements will be complied with for any air releases from the groundwater treatment system.

VI. Rationale For EPA's Selection of Its Preferred Alternative

A. Legal Requirements

1. The Legal Requirements That Govern This ROD

By virtue of section four of the Superfund Amendments and Reauthorization Act of 1986 (SARA) (enacted October 17, 1986), EPA's remedial alternative must meet the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by SARA, and the requirements of its governing regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. 1/ Accordingly, the Agency has selected a remedy that is consistent with its governing statute, including the cleanup standards in section 121 of SARA, and its regulations.

2. The Substantive Legal Requirements Themselves

Under its legal authorities, EPA's responsibility at Superfund sites is to undertake remedial actions that are necessary in order to protect the public health or welfare or the environment. 42 U.S.C. § 9604(a)(1); SARA § 121. In section 121 of SARA, Congress provides two guidelines for the Agency to follow in selecting remedies that are adequately protective.

First, in Section 121(b), Congress creates an extremely strong statutory preference for remedial actions in which treatment permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants or contaminants. In assessing various permanent solutions, EPA must specifically address the long-term effectiveness of the different alternatives. EPA shall at a minimum take into account:

(A) the long-term uncertainties associated with land disposal;
(B) the goals and requirements of RCRA;
(C) the persistence, toxicity, mobility and propensities to bioaccumulate of the hazardous substances and constituents;
(D) the short and long term potential for adverse health effects from human exposure;
(E) long-term maintenance costs;
(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and
(G) the potential threat to human health and the environment associated with excavation, transportion, and redisposal, or containment.

Congress prescribes that, in choosing its final remedy, EPA must select a remedial action that uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Further, in section 121(d), Congress provides that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws (such applicable or relevant and appropriate requirements sometimes will be referred to as ARARs). Examples of such laws considered in this document are RCRA, TSCA, and State standards.

B. Legal Requirements Applied To This Site

The discussion in the sections above and the data in the RI/FS establish that substantial amounts of hazardous substances currently are present on site, in the groundwater and in the soil; that many of these hazardous substances are present in high concentrations; and that several are potential carcinogens. These high concentrations potentially pose several types of risks. The groundwater is unusable as a drinking water source because of the contamination. In addition, the contaminated soil may pose a risk through direct contact. Third, the VOC-contaminated soil also poses an indirect risk; if left unremediated, the VOCs will continue to migrate into the groundwater and prolong and exacerbate the groundwater contamination. In short, the site in its current condition presents a threat to human health and the environment in several ways.

1. A Treatment-Based Remedy Is Appropriate For This Site

EPA has three basic options for addressing the risk to human health and the environment that the site presents. First, there is a no option alternative. Under this option, the Agency would fence the site and otherwise prevent access to it. In addition, the Agency would monitor residential drinking water wells in close proximity to the site to ensure that they are not being adversely affected. EPA's remedy would do nothing to eliminate or minimize the various types of threats themselves.

EPA rejects this no action approach for four related reasons. First, this approach would not adequately protect human health or the environment. Institutional controls are unreliable to prevent exposure to a site, especially over a substantial period of time. This inadequacy is of particular concern in this case since presently the site is relatively remote and trespassers might well go unnoticed. In the future, a problem could occur for the opposite reason. The general vicinity of the site could undergo rapid development if it follows the trend in other parts of southern New Hampshire. The greater amount of human activities in the area of the site would pose problems in preventing access and exposure to the site.

Second, this approach does not comply with ARARs. A no action alternative would not comply with either RCRA, TSCA, or State standards. 2/

Third, Section 121(b) of SARA requires that the Agency select remedies that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances to the maximum extent practicable. As is discussed elsewhere, other alternatives which better satisfy this statutory preference are available for this site. The no action alternative is at the opposite end of the spectrum in terms of permanence from this statutory preference.

Finally, in addition to protecting human health, a second EPA statutory mandate is to protect the environment. See e.g., SARA § 121. A no action remedy which includes institutional controls to prevent access to the contaminants is clearly not the cost effective way of protecting the environment. Section 101(8) of CERCLA defines "environment" to include groundwater within the United States. As was noted above, the contaminated groundwater under the site once was usable and it is part of an aquifer that currently is being used. Protecting the environment under CERCLA includes both preventing additional environmental harm and restoring the "harmed" environment to a usable state. Institutional controls would be completely ineffective in accomplishing this goal.

In short, the Agency's rationale for rejecting a no action alternative is as follows. First, such a remedy would be unreliable and of questionable effectiveness in terms of protecting human health. Second, such a remedy would be totally ineffective in terms of protecting the environment. Third, such a remedy does not comply with relevant and appropriate requirements. Finally, no action is exactly what Congress did not intend to encourage in creating a strong statutory preference for remedies that destroy wastes.

EPA's other two options for eliminating or minimizing the risk that the site presents are (1) to contain the hazardous substances, or (2) to destroy or significantly reduce the toxicity, mobility, or volume of these hazardous substances. 3/ EPA has selected the option of permanently and significantly reducing the toxicity of the wastes as the appropriate remedy for the site because such a remedy would be a more reliable approach for protecting human health and the environment, especially in light of the conditions at this site. Such a remedy also is appropriate because it is consistent with SARA's statutory mandate that the Agency select permanent remedies to the maximum extent practicable.

This site is a relatively small site located in an area where future use of the site for development is a realistic possibility. The soil at the site contains several hazardous substances. Several of these hazardous substances, including a number of the VOCs and PCBs, are extremely toxic. Some of the VOCs are carcinogens or suspected carcinogens. Moreover, the VOCs are unusually mobile and the PCBs are unusually persistent hazardous substances. Further, the continued presence of these substances on site will exacerbate the already high levels of contaminants in the groundwater; this contamination prevents the present use and will prevent the future use of the groundwater as a drinking water source.

A remedy based on treatment of these hazardous substances in the soil will minimize soil contamination and ensure no human contact with soil that is contaminated at unsafe levels, by significantly reducing the toxicity of the contaminants. This soil treatment will have the additional benefit of assisting the cleanup of the groundwater by eliminating the continuing source of contamination from leaching of hazardous substances from the soil into the groundwater.

EPA also believes that the remedy of pumping and treating the groundwater will significantly reduce groundwater contamination and permit the eventual use of the groundwater beneath the site for drinking water. Futher, cleaning up the groundwater will eliminate a possible source of contamination to off site surface waters and groundwater.

Finally, this remedy satisfies the statutory mandate that EPA select a remedial action that is protective of human health and the environment and that is a permanent solution to the maximum extent practicable.

In contrast, the alternative of capping the VOCs and landfilling the PCBs is not an appropriate remedy. Over the long-term there are no guarantees that such containment will remain effective. Further, containment will not remove the soil contamination; leaching of these contaminants into the groundwater, particularly the VOCs, would continue, although at a reduced rate compared to present, unremediated conditions. Failing to treat the groundwater would render the groundwater on site unusable for drinking water for a substantial period of time. In addition, the groundwater would be a continuing source of contamination to off site surface waters and groundwater.

In short, based upon several factors, including (1) the greater reliability and, hence, the greater protectiveness, of the treatment-based approach, (2) the need for reliability in light

of the substances present at the site, and (3) the strong statutory preference for permanent remedies, EPA's treatment-based remedy is the appropriate remedy for this site.

2. Level and Type of Treatment

(a) Groundwater Contamination

Portions of 40 C.F.R. Subpart F are relevant and appropriate because they address situations similar to the site, notably, situations where hazardous wastes are present in both the soils and the groundwater. Subpart F of RCRA provides that groundwater must be cleaned up to background, to MCLs, or to risk-based alternate concentration limits (ACLs). The Agency thinks it appropriate to restore the groundwater on site, as well as the groundwater off site, to drinking water quality. As noted above, this is an aquifer that is used as a drinking water source now, and whose use can be expanded by cleaning up this site. 4/ Thus, risk-based levels need to be established throughout the site as well as off site to ensure that all potentially usable groundwater is of drinking water quality. At this site, EPA selected a cancer risk level of 10^{-5} for the groundwater (EPA's remedy also will clean up noncarcinogens in the groundwater, such as metals, to drinking water standards).

EPA determined that its remedy should clean up the groundwater under the site to a 10^{-5} cancer risk range based upon several factors. First, EPA considered the Agency's Groundwater Protection Strategy (GWPS) (Office of Ground-Water Protection, August 1984). The GWPS provides guidance concerning how different groundwaters throughout the country should be classified and to what extent cleaning up a particular groundwater is appropriate, given where it fits in the classification scheme. Second, EPA considered the Agency's Draft Guidance on Remedial Action for Contaminated Groundwater at Superfund Sites (October 1986), and the Agency's approach to the Millcreek Superfund site, in determining that it should consider the 10^{-4} - 10^{-7} range of risk levels in selecting a risk level for the groundwater at the O & G site. Finally, the Agency determined that it should clean up the groundwater to a 10^{-5} risk level based upon the particular conditions at this site.

EPA's GWPS guides the Agency in setting policies on groundwater protection, depending on the designated or potential use of the groundwater. The Preamble to the NCP lists the GWPS as one of

the criteria, advisories, and procedures that should be considered in developing a remedy. 50 Fed. Reg. 47949 (Nov. 20, 1985). The GWPS provides that EPA's policy on groundwater protection should consider the highest beneficial use to which particular groundwater can presently or potentially be put. GWPS at 5. The GWPS defines protection policies (i.e., policies concerning levels of protection and cleanup) for three classes of groundwater, based on their respective value and their vulnerability to contamination. Id. Class I groundwater is special groundwater that is irreplaceable (i.e., no reasonable alternative source of drinking water is available to substantial populations) or ecologically vital (i.e., the aquifer provides the base flow for a particularly sensitive ecological system that, if polluted, would destroy a unique habitat). Id. at 5-6.

Class II groundwaters include groundwaters that are current or potential sources of drinking water and waters having other beneficial uses. Class III groundwater is not considered to be a potential source of drinking water and to be of limited beneficial use (i.e., groundwater that is heavily saline or is otherwise contaminated beyond levels that could be cleaned up). To fit into Class III, groundwater also cannot migrate to Class I or II groundwater or have a discharge to surface water that could cause degradation. Id.

Here, the groundwater that underlies the site is Class II groundwater. This groundwater is considered to be a current drinking water source since groundwater is used for drinking water within a two mile radius of the site. Except for the contamination caused by the site, the groundwater in the area is of drinking water quality. The natural condition of the groundwater makes it possible to develop the area, including installation of drinking water wells in the future. There were operational drinking water wells on site in the 1950's and 1960's. This groundwater also migrates to Class II groundwater that is being used as a drinking water source now.

EPA's Superfund Public Health Evaluation Manual (OERR 1986) establishes that in selecting a risk level for groundwater that is or may be used as a drinking water source, EPA should use a carcinogenic risk range of 10^{-4} to 10^{-7} (1 in 10,000 to 1 in 10,000,000). Id. at 101. See also the Millcreek Rod (issued on May 7, 1986 by EPA Region 3), and the Millcreek Memorandum from Winston Porter, EPA Assistant Administrator for OSWER, dated May 24, 1986. The Millcreek Memorandum indicates that the goal of achieving a 10^{-6} cancer risk level within a short period of time (one to five years) should be used as a point of departure in analyzing a range of alternatives. Memo at 2. In selecting an appropriate risk level at this site, and a time frame for

reaching it, EPA took the following major factors into account:

1. Site and groundwater characteristics;

2. Cost, reliability, speed, and technical feasibility of each alternative;

3. Anticipated future need for the groundwater;

4. Effectiveness and reliability of institutional controls that might be used as part of a remedy;

5. Public acceptability of the options; and

6. Ability to provide an alternative water supply.

Concerning the appropriate cancer risk level, EPA has selected 10^{-5} for the groundwater throughout the site and in the groundwater that has migrated off site. The 10^{-5} levels for 1,2 dichloroethane, trichloroethylene, tetrachloroethylene, and benzene individually are 3.8 ppb, 26 ppb, 6.7 ppb, and 13 ppb, respectively. These levels approach the limits of monitoring capability. The concentrations discovered in the soil after the IMC cleanup and in the groundwater to date for these substances are well above these acceptable concentrations. For example, for 1,2 dichloroethane, measured levels include 790 ppb (groundwater), for trichloroethylene, 3,900 ppb (soils), 3710 ppb (groundwater), for tetrachloroethylene, 160,000 ppb (soils), 9400 ppb (groundwater), and for benzene, 1,400 ppb (soils), 500 ppb (groundwater)(higher levels in the soil than those listed above were discovered before the IMC cleanup; such higher levels may have been missed during the cleanup and may continue to be present on site even though they were not discovered during the post-IMC cleanup sampling).

For several reasons, EPA rejects a level of 10^{-4}. The following concerns, many of which are interrelated, are among the most significant. First, EPA anticipates that there may be a future need for this aquifer, including the contaminated portion of it. This is a Class II aquifer, that is, parts of it are used as a source of drinking water source, and the contaminated portion of this aquifer has the potential to be used as a drinking water source. Given the hydrogeologic uncertainties at the site, EPA does not think it is prudent to select a risk level that, if met everywhere, will produce a barely adequate drinking water supply. This is particularly true since no alternate water supply system is in place, although one potentially could be installed, at considerable expense. In addition, should the aquifer be used by private homeowners, it probably would be without the benefit of treatment or consistent monitoring. Based upon all of these factors, EPA does not believe that a 10^{-4} level would leave an

adequate margin for error. EPA has ruled out levels of 10^{-6} and 10^{-7} at this time because, under the circumstances of this site, the 10^{-5} level is adequately protective, and therefore it would not be cost effective to clean up beyond that level. Moreover, 10^{-5} for the substances involved is at the limits of monitoring ability. As a result, it is technical infeasible to clean up beyond that level.

The final issue concerning the groundwater is to determine the appropriate way to clean it up so that it attains a 10^{-5} risk level. In addition to SARA's emphasis on restoration, EPA's policies support active restoration in this case. As noted above, the aquifer system is a Class II aquifer; it is currently used as a drinking water source, and the contaminated portion of the aquifer may be needed as a drinking water source in the future. In addition, as noted above, an alternative water supply is not currently available. Third, high concentrations are present in groundwater that may be used, and the groundwater is not likely to clean itself up through natural attenuation in the foreseeable future.

Given these facts, and the mobile and toxic nature of the constituents, there would be significant long-term uncertainties associated with either natural attenuation or containment, and both a short and long-term potential for adverse health effects from human exposure if either approach is adopted and then fails, particularly if the site is developed. There also would be a possibility of future remedial action costs. The public also has demanded usable water quickly. In its comments, the local citizens group, WASTE, made clear its grave concerns about the need for an assured drinking water source, asking not only for a total, rapid cleanup, but also for an alternate water supply as an added precaution. All of these facts, in addition to the fact that effective technologies are available to treat the contaminants in the groundwater, support a need for rapid restoration.

(b) Soils

(i) VOCs

A remedial action is required for two types of soil contamination that are on site. Concerning the volatile organic compounds (VOCs), actions are necessary to achieve short-term and long-term groundwater objectives, notably restoring the groundwater for use as a potential drinking water source. The Millcreek Memorandum (at page 3), among other documents, reflects EPA's approach of designing a source control remedy consistent with the need to clean up groundwater. EPA's goal in selecting a remedial action for the source is to achieve a 10^{-5} risk level in the groundwater on the site. EPA will clean up a sufficient quantity of soils to sufficiently low concentrations to accomplish

this objective. The volume of soils to be remediated depends on variables such as the mass and distribution of contaminants in the soils. As part of the remedy, a pre-excavation survey will be done that will lead to a refined assessment of the mass and distribution of contaminants in the soils. EPA has costed out this portion of the remedy based upon GZA's estimates as to the volume of contaminated soils, and upon its assumption that the soils will need to be treated to 1 ppm total VOCs. The Agency will refine its cost projections once it has completed design.

As is discussed above, the Agency has selected a treatment-based remedy for this site because it provides a greater degree of protectiveness, and because its selection would comply with EPA's statutory mandate to select permanent remedies where practicable. Thermal aeration is the cost effective remedial technology for cleaning up the VOC soils. 5/ The Agency prefers thermal aeration to the rototilling type of aeration. The former would be much more efficient and reliable and hence it is more likely to be effective. It also is safer in terms of its potential emissions into the atmosphere. Consequently, the Agency has costed out its remedy on the basis that it will use thermal aeration. Nevertheless, during design, EPA will consider proposals using rototilling and other aeration technologies as well as thermal aeration proposals. The Agency will make a final decision as to the type of aeration to use based upon the effectiveness and safety of these technologies when used under the specific conditions present at this site.

(ii) PCB Soils

PCB-contaminated soils also are present on site. Reducing the concentration of PCBs to a level of 20 ppm would adequately protect human health and the environment, based upon EPA Guidance (Development of Advisory Levels for Polychlorinated Biphenyls (PCBs) Cleanup, prepared by the Exposure Assessment Group, Office of Health and Environmental Assessment, May 1986), and the site-specific analysis contained in the October 29, 1986 memorandum that is included in the administrative record. With respect to the PCBs in the sediments, EPA has selected a concentration of 1 ppm. This limit is a conservative one that is based upon potential risks to birds and wildlife.

As noted above, the permanent remedy of thermal destruction (incineration) rather than a containment alternative is preferable for several reasons. Incineration is a proven treatment process for PCBs and other organic compounds. It is a high temperature process that in most cases destroys the compounds. With incineration, there will be none of the long-term uncertainties that would exist if the PCBs (which are unusually persistent and

toxic) were capped, covered, landfilled, or merely left alone. Similarly, EPA will not need to worry about long-term maintenance costs, about the potential for adverse health effects if containment fails, or about the need for additional expenditures if land disposal were tried and it failed. EPA projects that approximately 5,000 cubic yards will need to be incinerated. The Agency has developed its costs on this basis. This figure will be refined during the design phase of the remedy. The Agency will make a final decision as to the type of incineration to use based upon the effectiveness and safety of these technologies when used under the specific conditions at this site.

3. Applicable or Relevant and Appropriate Requirements

(a) Groundwater

In determining the applicable or relevant and appropriate requirements for remedial actions involving contaminated surface water or groundwater, the most important factors to consider are the uses of the water and the purposes for which the potential requirements are intended.

The actual or potential use of water, and the manner in which it it used, will determine what kinds of requirements may be applicable or relevant and appropriate. For Class III-type groundwater that cannot be used for drinking because of high salinity or severe contamination, drinking water standards are neither applicable nor relevant and appropriate. If the groundwater or surface water is always treated at the well-head or at a treatment facility, drinking water standards apply at the tap. Groundwater or surface water that is directly used for drinking must, however, be cleaned up to drinking water levels.

For contaminated groundwater, the applicable or relevant and appropriate standard will generally be the RCRA Groundwater Protection Standard (Part 264, Subpart F). The Groundwater Protection Standard allows setting a level at background, at a protective alternate concentrations limit (ACL), or, for a small set of chemicals, at a specified concentration limit. For Superfund purposes the ACL is generally most appropriate, based on the use of the groundwater.

For water that is intended to be used for drinking, the point of departure for setting an ACL should generally be the Maximum Contaminant Levels (MCLs) set under the Safe Drinking Water Act. Of course, where the groundwater being cleaned up will be supplied directly to 25 or more households, MCLs are legally applicable. Otherwise, MCLs are generally the most appropriate standard

for actual or potential drinking water.

The levels to which groundwater will be cleaned up at this site are at the limits of monitoring ability. The statute requires that the remedial action comply with MCLGs where they are relevant and appropriate. Because the levels selected in this remedy are already at the limits of our monitoring ability, the question of whether MCLGs are relevant and appropriate at this site need not be reached. The levels do meet the proposed MCLs that have been established for the indicator chemicals.

State groundwater regulations are relevant and appropriate for this site. State groundwater regulations require that EPA's remedy treat the groundwater to achieve a 10^{-6} cancer risk level for trichloroethylene and tetrachloroethylene at Route 125. See Ws 410.05(e), 410.09, and 302.08. Consequently, the State requirements constitute an independent basis for cleaning up the groundwater at Route 125 to a 10^{-6} level for these substances. As noted above, EPA's remedy will treat the groundwater on the site, as well as at Route 125, so that the trichloroethylene and tetrachlorethylene levels are each 5 ppb, which is a 10^{-6} cancer risk level.

(b) Soils

RCRA's closure requirements are relevant and appropriate for the contaminated soil. EPA's remedy, when complete, will comply with these requirements. If EPA's remedy does not satisfy these requirements, the Agency will consider what additional action (if any) is needed.

TSCA is relevant and appropriate concerning the PCBs greater than 50 ppm under the circumstances of the release or threatened release at this site. Accordingly, EPA has selected a remedial alternative that attains the level of control required under TSCA. TSCA requires that PCB-contaminated soils above 50 ppm be incinerated or landfilled. 40 C.F.R § 761.60(a)(4). TSCA's 50 ppm limit is not a risk or health-based standard. EPA's remedy is health based and will exceed this standard.

CONCLUSION

The soil and groundwater at the Ottati and Goss Superfund site contain high concentrations of a wide variety of hazardous substances. Because these hazardous substances are present, the site poses a threat to human health and the environment. EPA's three primary options for addressing this risk are (1) to allow the risk to continue to exist but to prevent access to it by imposing land use controls (the "no action" option); (2) to minimize the risk by capping the contaminated soil; and (3) to

minimize the risk by treating the hazardous substances to levels that are protective of human health and the environment.

EPA has selected the third option as its remedy. EPA has a high level of confidence that by significantly reducing the toxicity of the hazardous substances present at the site, this remedy will be effective in minimizing the risk that the site poses. Neither of the other options will achieve a similar result of reducing the toxicity of the waste. Hence, particularly over the long term, EPA's treatment-based remedy is significantly more reliable than either alternative option. In short, the major reason EPA has decided to treat the wastes is that the Agency believes that this remedy will do the best job of protecting human health and the environment.

EPA's decision that a treatment-based approach is the appropriate remedy for this site is supported by ARARs and by the Agency's governing statutory scheme. Section 121(b) of SARA requires that the Agency select treatment-based remedies to the maximum extent practicable. This extremely strong statutory preference for remedies that permanently and significantly reduce the toxicity of hazardous substances buttresses EPA's view that a permanent remedy is the appropriate solution to the risk this site presents. This is particularly true given the relatively small size of the site and the extremely toxic, persistent and mobile character of many of the hazardous substances located on the site.

Finally, EPA's treatment-based remedy also meets the statutory mandate of cost effectiveness. The cost of this remedy is $14,700,000. Other iterations of the treatment-based remedy (for example, alternative 15 in the RI/FS provides for incinerating the VOC-contaminated soils as well as the PCB-contaminated soil), would cost considerably more.

FOOTNOTES

1/ Section 4 of SARA provides that unless otherwise specified, the effective date of the 1986 amendments is their date of enactment (October 17). Thus, in general, the provisions in SARA apply without qualification to this ROD. Section 121(b)(2) contains an exception to this general rule, providing that a ROD issued within 30 days of SARA's enactment need only comply with the section 121 cleanup standards to the "maximum extent practicable." Because the Agency is not issuing this ROD within 30 days of SARA's enactment, the section 121 standards apply without being subject to this "maximum extent practicable" limitation. In any event, EPA's remedy complies with section 121.

2/ RCRA's Part 265 also contains standards for managing hazardous waste, but, as the Preamble indicates, it is the Part 264 standards, which are designed to be RCRA's ultimate standards, which guide CERCLA remedial actions.

If hazardous waste remains at the facility after closure, "post closure" care requirements are triggered for several types of RCRA facilities. These "post closure" requirements also may be relevant and appropriate to the circumstances of a Superfund site.

3/ As noted above, the RI/FS's final screening discussed six options. Three of these options are essentially those discussed above. Two of the remaining three are variations of the three discussed above, while the final alternative provides for disposing of all of the contaminated soil off site.

4/ 40 C.F.R. Subpart F provides that levels should be set at a "point of compliance", that is, at the boundary of the facility. This approach is not appropriate in a case such as this, where the Agency has decided to cleanup the groundwater on site. Concerning section 121(d)(2)(B)(ii)'s apparent limited authorization to set ACLs by assuming a point of exposure beyond the boundary of the facility, this provision allows the Agency, in its discretion, to set ACLs at a point beyond the boundary of the facility. First, this provision is inapposite because on site groundwater contamination needs to be cleaned up. Moreover, this site does not meet the three conditions for setting such ACLs. First, concerning the condition contained in section 121(d)(2)(B)(ii)(II), based upon the record, EPA is not prepared to conclude that the existing measurements or projections establish that there is or will be no statistically significant increase of such constituents from such groundwater in such surface water at the point of entry or at any point where there is reason to believe accumulation of constituents may occur downstream.

EPA also does not believe that subparagraph (III)'s requirement that the remedial action include enforceable measures that will

preclude human exposure to the contaminated groundwater at any point between the facility boundary and all known and projected points of entry of such groundwater into surface water can be met. Exposure to the contaminated groundwater could occur in the marsh between the site boundary and Pond, in wells that could be installed along the sides of the marsh, and in the outlet to the Pond. EPA does not believe that any current measure will preclude human exposure in these areas.

In short, EPA believes that Congress intended that ACLs using a point of exposure beyond the facility boundary only be used when the Agency has a high degree of confidence that all of the three 121(d)(2)(B)(ii) conditions are present at a site, and when the groundwater under the site itself is not going to be cleaned up. Here, EPA does not believe that these three conditions exist, and it also intends to clean up the groundwater under the site. Consequently, the Agency believes that setting ACLs beyond the site boundary is not appropriate. Such a position is buttressed by the State requirement that Route 125 should be the compliance point.

5/ EPA believes that the proper role for cost effectiveness is in comparing the cost of different alternatives that would achieve the same result. For example, both aeration and incineration would achieve the result of reducing the level of VOCs in the soil to acceptable levels, and EPA selected aeration because of the Agency's belief that aeration would be less costly. It is not appropriate, or necessary, to compare the cost of aerating the VOC-contaminated soils to the cost of capping these soils, or to compare the cost of incinerating the PCB-contaminated soils to the cost of landfilling them, because a cap or landfill would not achieve the same result as a treatment-based remedy. In this case, the difference in cost would not be dispositive in any event.

OPERATION AND MAINTENANCE

Operation and maintenance (O&M) are those costs required to operate and maintain the remedial action throughout its lifetime. This activity ensures the lifetime effectiveness of the remedial alternative selected.

The estimated capital, O&M and present worth costs for the recommended alternative are detailed on Tables 5 and 6.

State Role

The state's role in this federal lead site is multiple. The state reviews documents to determine if they are in compliance with applicable state laws and provides comments on all EPA funded studies at the site. The state of New Hampshire concurs with EPA's chosen remedy for the clean up of the O&G/GLCC site located in Kingston, New Hampshire. The State of New Hampshire will provide:

- 10 percent of the capital costs of the chosen remedy
- 10 percent of the operation and maintenance costs for the chosen remedy throughout the remediation process.
- 10 percent of costs associated with the monitoring of residential wells in use off site for the first year.
- 100 percent of costs associated with monitoring of residential wells and environmental monitoring in Country Pond.

TABLE 5

Recommended Alternative Cost Summary

Management of Migration Alternative - Groundwater Extraction and Treatment

INITIAL CAPITAL COSTS

Extraction Wells	$100,000	
Pumps & Piping	$225,000	
Access Road to Marsh	$137,500	
Treatability Studies	$62,500	
Equalization	$175,000	
Precipitation/Flocculation	$400,000	
Air Stripping	$130,000	
Biological Treatment	$250,000	
Ion Exchange	$1,075,000	
Air Quality Monitoring	$7,500	
	$2,562,500	

OPERATION AND MAINTENANCE (O&M) COST

Total annual cost including Pumping, Maintenance, Labor, etc.	$755,000	
Environmental Monitoring	$100,000	
	$855,000	
Present Worth O&M costs	$3,250,000	(Assumes 5 year treatment)
Total Alternative Costs	$5,812,500	

TABLE 6

Recommended Alternative Cost Summary

Source Control Alternative - Aeration (low temperature thermal stripping) and incineration

INITIAL CAPITAL COSTS

Demolition Pre-Excavation	$300,000
Site Preparation	25,000
Pre-incineration Studies	75,000
Aeration Pilot Studies	175,000
Incineration System (1)	2,430,000
Aeration System (2)	2,625,000
Site Cover	400,000
TOTAL INITIAL CAPITAL COST	$6,030,000

OPERATIONS AND MAINTENANCE (O&M) COST

On-Site Treatment System	$650,000
Site Maintenance	90,000
Material Handling	50,000
Monitoring and Analysis	90,000
TOTAL ANNUAL O&M COSTS	$ 880,000
PRESENT WORTH O&M COSTS	$2,400,000
Annual Costs for Post-Closure Monitoring Upon Completion of Remedy(3)	$100,000
PRESENT WORTH POST-CLOSURE	$950,000
*TOTAL ALTERNATIVES COSTS	$9,380,000

*Based on estimated quantity of 19,000 yd^3

(1) Costs based on mobile incinerator and include all costs, including O&M, in this item.

(2) Costs for this item include excavation and all other pertinent items for this system.

(3) Costs for this item are based on the assumption that post-closure would be required for 30 years.

SCHEDULE*

Sign Record of Decision.	January 16, 1987
Project design, to include treatability studies.	June 1, 1987
Begin construction of on-site soil treatment facilities and groundwater treatment system.	July 1, 1988
Construction complete.	June 1, 1989
Begin on-site excavation and groundwater extraction and treatment.	August 1, 1989
EPA evaluates groundwater treatment for consistency with remedial objectives.	August 1, 1994

* EPA would follow this projected schedule if this were a Fund lead site. Due to the pending litigation, it is not certain that this remedy will be implemented according to this schedule.

COMMUNITY RELATIONS

Throughout the site's history community concern and involvement has been high. Local concern has focused on the health hazards associated with the soil and groundwater contamination. Also there is a wider, regional concern about the contamination of surface waters, particulary nearby Country Pond. The primary desire among local citizens and officials is that the site be cleaned up as soon as possible and Country Pond is protected from contaminants migrating from the site.

Local citizens have organized a group called "We Agree - Save The Environment, Inc." (WASTE, Inc.). This group has been active with state and local officials, as well as national organizations such as the Environmental Defense Fund and the Izack Walton League. In addition, local and state officials including members of the Legislative Delegation, the Governor and his staff, and members of the Congressional Delegation and their staffs, have been actively involved in and are interested in site activities.

Throughout the RI/FS, EPA and the State of New Hampshire have been involved in litigation with five potentially responsible parties; International Minerals and Chemical Corporation (IMC), which currently owns the GLCC site, and four firms collectively known as the Generators (General Electric Company, Lilly Industrial Coatings, Inc., Solvents Recovery Services of New England, and K.J. Quinn & Company, Inc.)

A public informational meeting to describe the FS alternatives was held at the Kingston Town Hall in Kingston, on September 4, 1986. The meeting was well attended by citizens, local officials and legal representatives of potentially responsible parties. On September 18, 1986 a public hearing was held at the same location to record comments by any interested parties. Comments were given by WASTE Inc., Senator Warren Rudman, New Hampshire State Representative David A. Welch, Hartley Bailey, resident of Newton Junction, the Town of Newton Board of Selectmen, Congressman Robert C. Smith, the selectmen of the Town of Kingston, Mr. Vautier, an interested citizen, International Minerals and Chemical Corporation (IMC), and Mr. Hannigan, citizen of Kingston. Written comments were also received from all of the above mentioned, the four generators and the Town of Amesbury, Massachusetts Board of Health during the remainder of the comment period. The formal, three week comment period to accept oral and written comments on the feasibility study alternatives took place from September 4, 1986 until September 25, 1986.

A second comment period was held to receive public comments on the Preferred Remedy from October 29, 1986 until November 21, 1986. At the request of community members, EPA extended the public comment period until December 5, 1986. Written comments were

received from WASTE, Inc., International Minerals and Chemical Corporation (IMC), the four firms collectively known as the Generators (General Electric Company, Lilly Industrial Coatings, Inc., Solvents Recovery Services of New England, and K.J. Quinn and Company, Inc.) and the firm of Bracken and Baran, representing Senter Transportation Company, Inc., Concord Realty Trust, Bernard Senter and Sally Senter- owners of part of the Ottati & Goss/Great Lakes Container Corporation Site.

Comments received during the comment periods and EPA's responses are included in the attached Responsiveness Summary. The Responsiveness Summary also contains a section on remaining community concerns, which summarizes questions the community raised during the RI/FS process, but were not submitted as formal comments. These are concerns that the EPA and the State should be aware of as they prepare to undertake remedial design and construction at the Ottati & Goss/Great Lakes Container Corporation Site.

Both WASTE and the Kingston Health Department (KHD) requested that an alternative water supply and additional wells be installed down gradient of the site for groundwater extraction and treatment to prevent migration of contaminants into private water supplies. WASTE and KHD believe these two actions should take place immediately, and be funded with emergency response funds.

U.S. Representative Robert C. Smith commended the FS objectives and emphasis on achieving permanent treatment. He stated his support for the request that a health study be conducted. He also urged EPA to take steps to ensure the quality of public health and to continue to monitor the water quality status for residential wells and Country Pond.

U.S. Senator Warren Rudman stated his support for the community efforts at the site and urged EPA to cleanup and treat soil and groundwater, implement a health survey and provide an alternative water supply where necessary.

U.S. Senator Gordon J. Humphrey stated it is time for EPA to take action in the implementation of a remedial plan. Senator Humphrey urged EPA to give thorough consideration of the recomendations of WASTE.

New Hampshire State Representative David A. Welch stated his full support for the recomendations of WASTE and urged all possible haste in actions to protect the public health and welfare.

The Town of Amesbury, Massachusetts expressed concern with the procedures which will be used to control the potential pollutant

release during the final remedial action steps. The town proposed that a monitoring network be established throughout the downstream waterways to ensure the quality of the water supply.

Mr. Hartley Bailey of Newton Junction, New Hampshire expressed concern that fish tested in Country Pond for contamination in 1984 and 1986 have not been tested for VOCs. Mr. Bailey stated that such tests would give a better indication of the depth of VOCs than the surface tests for VOCs which have been previously performed. Mr. Bailey also stated that state officials had promised to conduct VOC tests on the fish tested for other contaminants in 1986 but have failed to keep that promise.

Mr. Charles Hannigan of Kingston, New Hampshire urged EPA to take action and clean up the site. Mr. Hannigan expressed concern that too many studies, and not enough action, had taken place.

Mr. Duke Vautier of Pelham, New Hampshire commented that incineration below 3500°F leaves contaminated ash. Mr. Vautier suggested that EPA consider a pyrolysis process that would exceed 5000°F.

ENFORCEMENT ANALYSIS

The Ottati & Goss site is currently in litigation. The United States filed a complaint on May 18, 1980. The court bifurcated the trial. A 116 day trial on liability took place between December 5, 1983, and June 13, 1985. In its decision dated December 9, 1985, the Court concluded that the following defendants are liable for some or all of the hazardous substances present at the site:

Great Lakes Container Corporation
International Minerals & Chemical Corporation
Louis Ottati Sr.
Wellington Goss
Ottati & Goss, Inc.
Geochem
Senter Transportation Co.
General Electric Co
Concord Realty Trust
Bernard Senter
Sally Senter
K.J. Quinn Co.
Lewis Chemical Co.
Solvents Recovery Service of New England
Lilly Industrial Coatings, Inc.

The Court has scheduled the trial on remedy and damages to begin on February 2, 1987. The United States has had some preliminary settlement discussions with various defendants. It is not possible at this point to predict whether or when the United States will achieve a settlement with one or more of the defendants.

October 27, 1986

Permissible PCB concentration in soil, Ottati & Goss/GLCC, Kingston, NH

Pi-yun Tsai, Sc.D., Environmental Toxicologist
Water Supply Branch

Paul Marchessault, Site Manager
Superfund Branch

This is the follow up to our meeting of 10/23/86 regarding the derivation of a permissible PCB concentration in soil for the source areas clean-up at the Ottati & Goss/GLCC site. This memo includes clarification for concerns raised in the meeting.

Basic assumptions used in the calculation are: the most susceptible population at risk of exposure are 1.5 - 4 year old children and soil ingestion is considered the major contributor among all possible routes of exposure.

Assuming the clean-up goal is an incremental lifetime cancer risk of 10^{-5}, the permissible PCB concentration in soil for residential area is 20 ppm. Alternatively, if this site is considered as a non-residential area and the frequency of exposure for children visiting the area of contaminated soil is assumed to be 70 days per year (twice a week for 35 weeks excluding inclement weather), the permissible PCB concentration in soil is approximately 70 ppm.

$$\frac{10^{-5}}{4.34 \times 0.2\ g/day \times 10^{-3}\ g/Kg \times 30\% \div 17\ kg \times 245\ days/365\ days \times 3.5\ yr/70\ yr}$$

$$\simeq 20\ ppm$$

where:

10^{-5}: Assumed lifetime cancer risk level for clean-up goal
4.34: Cancer risk potency for PCB expressed as $(mg/kg/day)^{-1}$
0.2 g/day: Daily soil ingestion (not applicable to children with pica)
10^{-3} g/Kg: Conversion of g to Kg of soil ingestion
30%: Absorption rate of PCB in soil from GI tract
17 Kg: Average body weight for 1.5 - 4 years old
245/365: Yearly frequency of exposure (35 weeks per year excluding inclement weather)
3.5/70: Fraction of the lifetime for potential exposure

Since exposure through dermal absorption and inhalation (of PCB in ambient air and air particulates) are not incorporated in the calculation, the permissible PCB concentration in soil could be lowered than what is presented. Compared to soil ingestion, dermal absorption of PCB from contaminated soil is considered insignificant. Inhalation of PCB emitted from contaminated soil to the ambient air and suspended particulates might contribute as much health risk as that from ingestion of contaminated soil.

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